Telephony

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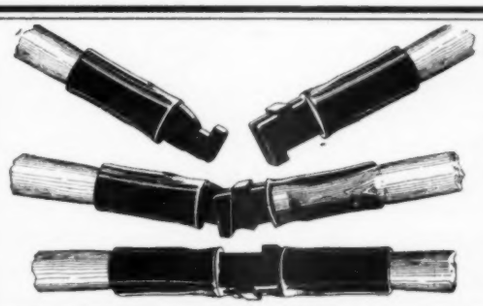

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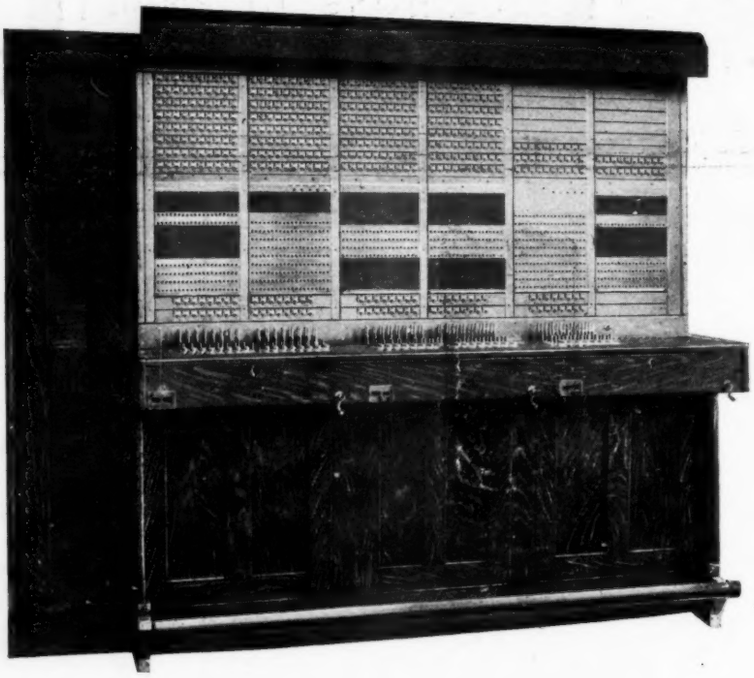

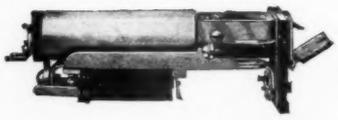

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

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CURRENT OPINIONS AND COMMENTS

One of the principal bulwarks of Independent telephony that has contributed largely to its success in the past has been the fact that it has had the active, loyal support of the "home folks."

Independent telephone companies have been organized and run by local people. They subscribed to the stock or bought the bonds that supplied the capital which put the telephone plant in operation. They became telephone subscribers because they needed the service, and, generally speaking, they did all they could to boost the business because they were financially interested in its success.

Local ownership has always been a cardinal principle in the Independent telephone movement, and it is interesting to note that a similar policy is being recommended not only for other utilities but for corporations of various kinds. Roger W. Babson, the financial authority, calls it "customer ownership," but the idea is practically the same. At some length he commends the policy of a utility corporation selling its securities to its employes and customers.

* * * *

Notable examples of this policy have recently been furnished by the Commonwealth Edison Co. of Chicago, the largest producer of electrical energy in the world, and the Bell telephone organization. Mr. Babson cites these cases naturally on account of their magnitude, but the principle involved is the principle on which Independent telephone companies have been operating for many years. His comments are indeed interesting.

"Government ownership to displace concentrated capital ownership has been the alternative usually proposed in consideration of the problems of our essential industries," says Mr. Babson. "Recently however, progressive public utility companies have blazed a new trail. Their success with what is now called 'customer ownership' gives promise of a solution for other lines.

"I believe that we have here the beginning of a working plan for public co-operation with private management that may be applied equally well to railroads and possibly to some of the industries providing the necessaries of life. Approximately, $100,000,000 has been provided certain of the utility companies within the last two or three years through customers' subscriptions to the capital stock.

* * * *

"The building up of share-holders' lists at home assures any company the friendly interest of the public it serves, and is an evidence of good faith to a far-away investor in its bonds. Two factors especially favor the small investor who begins with the home utility list.

"In the first place, the charted average business of utilities shows a steady progress over both good times and bad times. In the second place, the regulation imposed by public officers in most states gives to the investor a certain degree of protection for his property."

Rate-making commissions in "most states," it may be remarked in passing, do have regard for the investors' rights and give the utilities a revenue that insures a fair return on the capital. In some states, however, where political demagogues rule, the protection is uncertain. Fortunately, there is appeal to the courts from commission rulings which impose inadequate, confiscatory rates.

* * * *

Continuing his comment on the "customer ownership" policy, Mr. Babson says:

"Without a progressive telephone and public utility service there can be no growing community. Companies furthering this plan of customer ownership are helping to solve questions of the distribution of property and the problem of corporate ownership and operation as opposed to political operation.

"Is not the true solution to have our street car system owned by the riders, our electrical companies owned by the users of the power, our telephone business owned by the subscribers? The complaint against our public utilities comes from those who use them. When those who use them are the owners, there will be few complaints, partly for the reason that under such ownership the company will indulge in few injustices.

"From the standpoint of the investor this is a particularly favorable time to institute such a plan. Most of the public utilities have already seen their hardest times and are now beginning to profit

from the decline in commodity prices and lower operating expenses. In most cases, therefore, the consumer stands a fair chance through investment in a good public utility."

* * * *

"Reading maketh a full man," said Bacon, the English philosopher and statesman several hundred years ago. In these days of prohibition, the word "full" seems more incongruous than usual, although, if one wished to make a joke out of it, he could interpret the "reading" must be done by the druggist who puts up the prescription that provides the man with the desired "hooch." Speaking seriously, however, the philosopher was right in the statement that reading broadens a man, helps him to do better work and fits him for a better position.

That is why Mr. Paxton in his articles in TELEPHONY on improving individual efficiency, urges telephone men to read more about their work. He says out of 600 telephone employes with whom he is acquainted, only three have ever taken a correspondence course. This may be a low percentage, but it doesn't necessarily mean that telephone men do not read, for we know that they do. Maybe they do not read and study as much as they should, but who of us does everything he should do?

Anyway, TELEPHONY's mail proves conclusively that telephone men do considerable reading about their work, for we never slipped and made a mistake in our columns that scores of subscribers did not catch it and write in about it. Yes, we've found telephone men read all right.

* * * *

Mr. Paxton's advice is good, for it is surprising how much solid, practical good a man can derive from only an hour a day of reading about his line of work. The history of business is full of examples of men who won success by reading up on their job during leisure hours.

In this fast age, many scoff at the old phrase of "burning the midnight oil" to get ahead and increase one's knowledge, but the idea works out effectively just the same. With daylight saving in vogue, we do not need to burn the midnight oil, but we do need all the more to keep up with the procession, and to do that we must keep posted on current developments.

Incidentally, telephone men will profit materially by reading the articles by Mr. Paxton and E. L. Gaines in TELEPHONY, and applying the information found therein for their own self-improvement.

* * * *

The demand for more telephones in these United States keeps up in good times and bad. As pointed out by the South Carolina commission, business depression seems to stimulate the demand for increased service. According to the figures of the Interstate Commerce Commission, the Class A telephone companies reported 729,438 more stations in service in April, 1921, than there were a year ago. This is a gain of more than 8 per cent. Including the growth over all other companies, it is a safe estimate that the annual gain was well over a million telephones.

The commission's figures also show an increase in operating revenues that indicates the rate-makers realize the necessity of adequate compensation. Living rates must be provided if the telephone is to reach its greatest usefulness.

Indiana Telephone Men Co-operate

Independent and Bell Companies Operate Separately, but Work Together for the Common Good of the Business—History of Events that Have Led to Better Understanding of the Telephone Forces in Hoosier State

By Chas. S. Norton

The cordial relations existing between the Indiana Bell Telephone Co. and the Independently-owned telephone companies in Indiana, is one of the greatest assets of the extensive telephone business of Indiana. The connecting arrangements bind these two groups of telephone property into one vast operating system with a common purpose and a mutual interest. This insures for the public universal and better telephone service, and for the investor a greater stability for his investment.

This has not always been true, as everyone in the telephone business well knows. The beginning of the twentieth century found these two groups at each other's throat, due to two widely different bases upon which the two groups were founded, to opposing principles of operation, and to a general lack of foresight on the part of the telephone companies and the public as to the future development and importance of the telephone.

The Bell at first was not an operating company but was merely the owner of the basic patent and the manufacturer of the telephone for lease purposes. At the very beginning, such a thing as a telephone system serving an entire community was not thought of. Switchboards and toll lines were not even an imaginary possibility.

The greatest use that the original owners of the patent saw in the telephone was an instrument at each end of a single wire extending between two offices, or the office or place of business and the home. The Bell company not only did not aspire, but refused, to furnish the wire connecting the instruments. All it desired to do was to lease two instruments to persons having use for them. This it did, and this was the beginning of the present Bell system.

A number of such sets of instruments having been leased in a community, men who could talk from their places of business to their homes began to inquire why it was not possible to arrange their lines so as to talk to each other. This suggested to the Bell company some form of switching device which it could also lease to responsible parties, so that parties in the same community, using individual lines, could extend the range of their service to other lessees of telephone sets. This was done and thus the modern switchboard had its beginning.

As someone had to be paid to operate the switching device, and as it was for the common use of all, it soon became apparent that responsibility for operating the switchboard, and payment of rental for it and the instruments, should be centered in one place instead of being divided among a number of parties, some of whom might be wholly undependable to meet their obligations.

To overcome these difficulties, corporations or associations were formed to handle the incipient community telephone service. These corporations or associations proposed to lease from the Bell the switchboard and instruments and to furnish the construction, and to operate

them for a stipulated monthly rental from each subscriber.

At this point in the development of the business, the Bell company ceased to deal with individuals and began dealing with the company, looking to the company for payment of the rental of instruments, switchboard and such other apparatus as the Bell company manufactured and on which it held the fundamental patents. As these companies leased their equipment from the Bell, they became companies licensed to use Bell apparatus, or licensee companies of the Bell.

As development proceeded, there were improvements in telephone instruments, switchboards, protective devices and terminals, all of which were covered by patents largely owned and controlled by the Bell company. The first community telephone companies that were organized were scattered, struggling, and in many cases doubtful affairs. It was difficult to interest capital or men of proven business judgment in them. They appealed to the Bell company for help. As it was to the interest of the Bell company to foster the development of the telephone, it became a stockholder in many of these companies by investment and the assignment to the companies of the right to use its patented apparatus.

In the larger cities, Independent men could not be found who had faith enough in the future of the telephone to organize operating companies, so the Bell had to take the initiative and organize and finance companies to give these cities telephone service for which they had begun asking. So far, the Bell had not thought of a monopoly of the telephone business of the United States. It was seeking only to encourage and foster means by which it could commercially make money out of its patented articles.

The advent of the toll line, the development of the art of telephony, and the incessantly growing demand for telephone service changed the entire telephone situation in the United States. Telephonically, communities no longer lived unto themselves. The short toll lines began binding groups into a system. Merger of isolated exchanges into larger operating groups for economy and service sake, was the order of the day.

Bell companies combined with Independents to form these larger operating groups. As the Bell owned the growing toll line system and the exchanges in the larger cities, and as many minor stockholders desired to sell their holdings, this combination into groups in most cases gave the Bell company a stock control.

This grouping of companies into larger operating units, which was accomplished about 30 years ago, gave the Bell control practically of all the telephone business in the United States. It was then that the Bell conceived the idea of monopolizing and holding a monopoly on the manufacture and use of telephone apparatus and the sale of telephone service.

For almost a score of years thereafter, it defended and attempted to carry into effect this monopolistic idea. Its thought of the telephone being a single system business was, and is, correct, but its principle of monopolistic ownership and operation was, and is, erroneous.

Many changes have taken place in the telephone field in recent years. Here is an article that clearly shows the evolution which has taken place in Indiana. Mr. Norton, the author, has been actively and continuously engaged in the telephone business in Indiana since 1895, 21 years of which he was with the Indianapolis and New Long Distance Telephone companies.

"Having been through the 'warfare,' it is so gratifying to me," says Mr. Norton, "to see the owners and managers of telephone companies devoting their capital and energy to giving service rather than fighting each other—and also to see numerous Independent companies in this state which in former years I helped to establish, becoming more firmly entrenched and getting on more secured bases—that I could not help but express my feelings by writing an article as the message to them.

"Realizing that 'Telephony' has a wider circulation among telephone men than any other telephone paper, I am anxious to get this message to them through your columns."

Mr. Norton's message is so in harmony with the spirit of the times—constructive instead of destructive competition and everyone working for the building up of a greater industry—that "Telephony" is glad to publish it.

The people hate, and will not long tolerate an unbridled and uncontrolled monopoly in any line, and so they soon came to hate and resent the Bell's monopoly of the telephone business. They said: "We will build our own telephone systems, and operate them in our own way, independent of the Bell company."

The expiration of the basic patents owned by the Bell gave the Independents their opportunity, so the Independent system had its beginning. The Bell sought to either keep them out of the field or force them out of business when they did get a foothold. The Independents sought not only to develop new territory, but to invade, as a rival and a competitor, territory already occupied by the Bell.

And then began one of the most destructive industrial and commercial warfares ever inaugurated in any business in the United States. Service was duplicated, rates were cut to the quick and expensive legal battles were fought. In the general warfare, each side almost lost sight of service and ceased in most cases to even try to earn dividends. To put its competitor out of business became the controlling passion and principle of each faction.

Millions in money were worse than wasted, the public was educated into the belief that telephone service could be given for much less than what it actually cost, and animosities were engendered that still make it difficult in many places to carry on the business as it should be done.

This destructive and demoralizing competitive warfare was caused from the fact that both systems, in my opinion, were attempting to carry into effect absolutely wrong and erroneous principles of operation—the Bell the principle of monopoly, the Independents the principle of independent operation.

The unit of telephone operation is not the community, nor the county, nor the state, but the entire United States. It is as impossible for one corporation to serve all the people of the United States with telephone service and serve them well as it would be for one manufacturer to furnish all the wearing apparel or one corporation to till all the farms. The business is too vast and extensive.

The weakness of the Bell system was its attempt to be a monopoly. On the other hand, the use of the telephone not being limited to one community or city, independent operation in each community or city of its telephone system is as unthinkable as it would be for them to try to operate independently the railway passing through their borders, or their postal system or banking business.

A business which serves all the people must have uniform methods and standards of operation and a uniformity of equipment throughout the entire land. The handicap of the Independent system was independency itself.

A little more than a decade ago the public, which had clamored for competition in telephone service and got it, began demanding relief from dual service. The two opposing systems began to realize that the basic principle upon which each was trying to do business could not successfully be carried into effect. The Bell receded from its principle of monopoly and the Independents discarded their principle of independency.

A new era was born in the telephone business and these two systems began doing business with each other, abolishing duplicate service, and working toward welding the telephone business into one vast operating system. Co-operation took the place of destructive competition, and a friendly helpfulness began to be manifested toward each other.

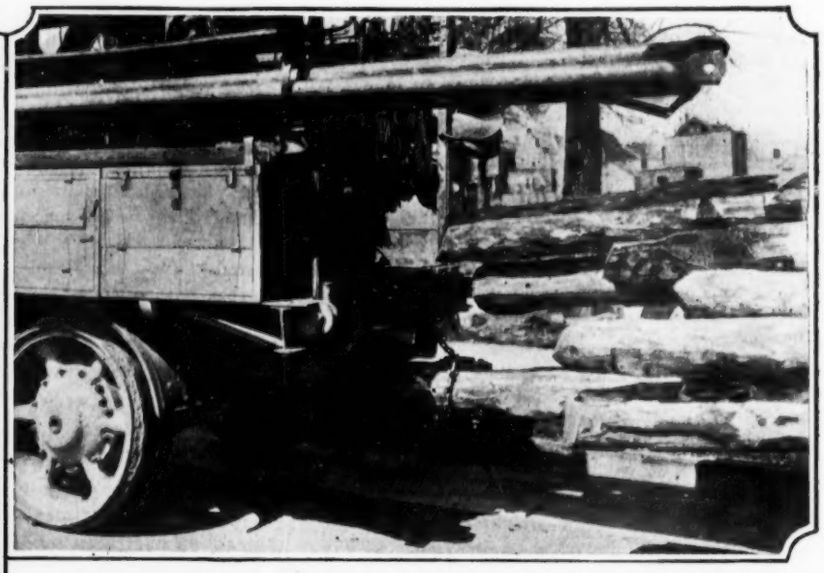
(*Continued on page* 31)

Pole Trailer Loaded—A Balanced Load Consisting of 15 35-Foot Class B Poles. The First Pole Placed on Trailer Projects Forward About Two Feet Beyond Rest for Towing Purposes. Every Other Pole Is Placed in the Proper Balance. Load Is Then Coupled to a Truck By Means of a Draw Bar Fastened to a Pole With Through Bolts and Is Then Tightened With Winch Line and Chains Bound.

Construction Short Cuts

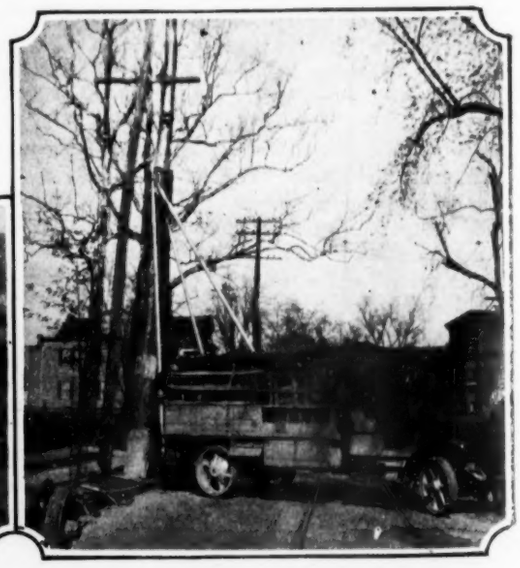
By E. P. Bradley and H. M. Benham, *New Jersey Construction Supervisors, New York Telephone Co.*

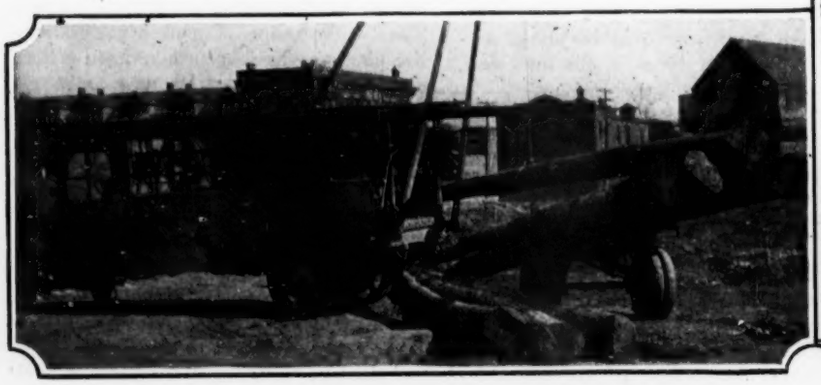
Labor-Saving Devices in Heavy Construction Work Supplant Brawn of Man and Beast—Originate in Field and Engineering Department—Presented by Courtesy of The Telephone Review



This Shows Trailer Lead Attached to a Truck With a Chain Placed Around the Key Pole and Fastened to the Truck as an Extra Precaution.

Pole Derrick Removing Butt—Under Ordinary Soil Conditions Butts Can Be Easily Removed With Derrick. The Center Leg Is Extended on a Steel Plate Base and Butt Is Pulled With Winch Line. When Conditions Are Not So Favorable, Jacks Are Used Under the Rear Corners of the Trucks to Relieve Springs. This Butt Is Then Started With Jacks and Pulled Out by Derrick. Usually It Is Much Cheaper to Extract the Butt With Derrick Rather Than Pole Jacks.

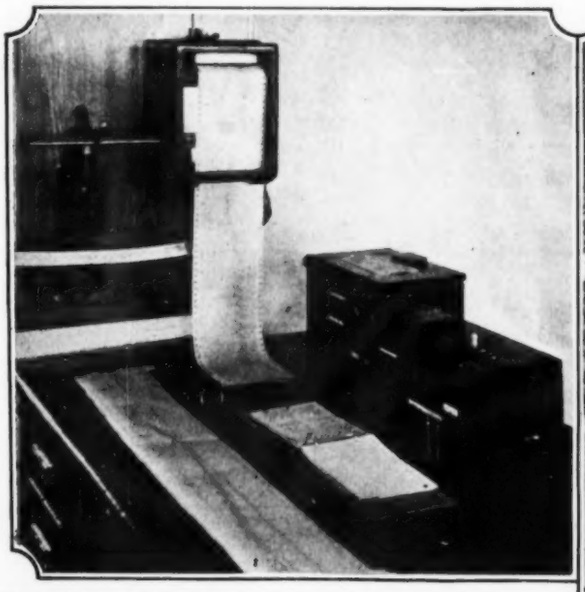




A Chauffeur and Two Men Can Load This Trailer With 15 35-Foot Class B Poles in From 3/4ths to 1½ Hours, Depending on the Location of the Poles. Poles Can Be Bought Locally and Carted 15 to 20 Miles With a Truck and Trailer at Less Cost Than at the Prevailing High Freight Rates.

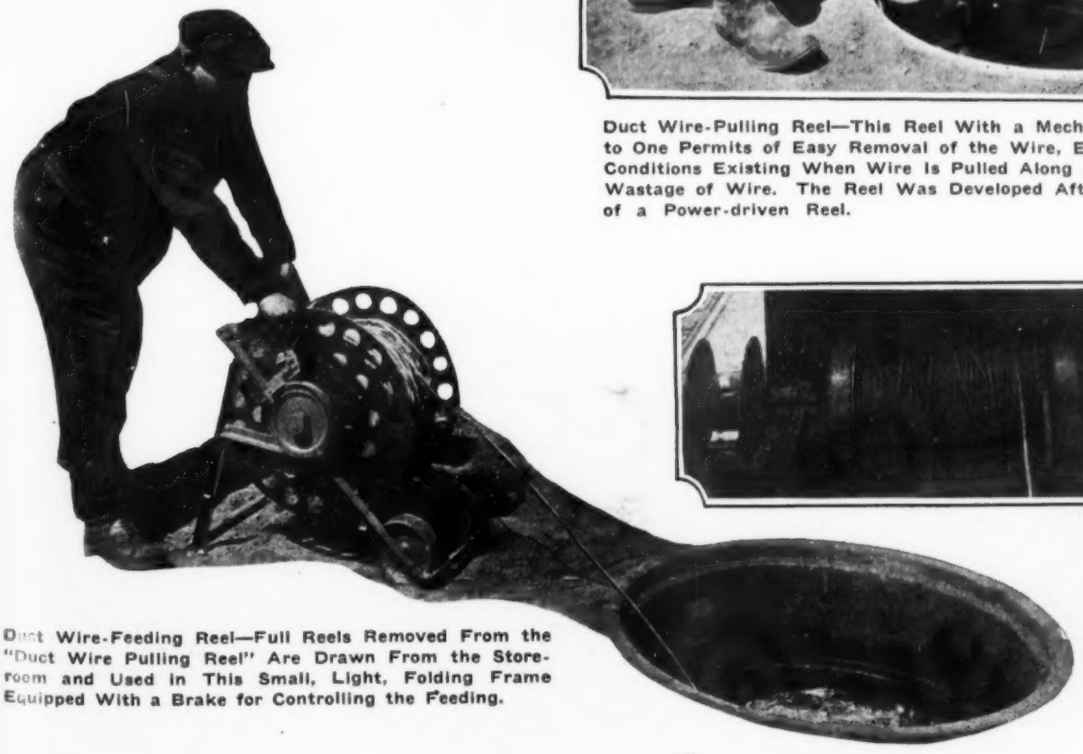
This Pole Derrick Is Replacing a 40-Foot Joint Pole. With the Exception of the Motor Truck This Is the Most Popular Apparatus With the Company's Field Force.

Pole Trailer on the Road—A Three-ton White Truck With Loaded Trailer Attached Proceeding to Job. With Holes Already Opened, It Will be a Simple Matter to Erect Derrick and Dispose of This Load.



Electrolysis Recording Meter, Perfected by New York Telephone Co. Man, Which Simplifies the Measurements of Currents Flowing on Electrolysis Bonds.

Duct Wire-Pulling Reel—This Reel With a Mechanical Advantage of Six to One Permits of Easy Removal of the Wire, Eliminates the Dangerous Conditions Existing When Wire Is Pulled Along a Street, and Eliminates Wastage of Wire. The Reel Was Developed After Careful Consideration of a Power-driven Reel.



Duct Wire-Feeding Reel—Full Reels Removed From the "Duct Wire Pulling Reel" Are Drawn From the Storeroom and Used in This Small, Light, Folding Frame Equipped With a Brake for Controlling the Feeding.

Centrifugal Pump — Delays and Cost Due to Wet Manhole Conditions Are Largely Overcome by This Pump, Driven by the Truck Motor and Capable of Pumping From 250 to 300 Gallons of Water Per Minute.

Principles of Telephone Traffic

One of a Series of Articles Setting Forth the Fundamental Elementary Principles of Telephone Traffic Work—Every Operator and Manager Shou'd Read These Articles—This Article Discusses The Local Telephone System

By E. L. Gaines

Traffic Superintendent, Home Telephone & Telegraph Co., Ft. Wayne, Ind.

Telephone service may be divided into two general classes—local and long distance.

Local service is usually understood to be service confined within the limits of a single city or an exchange district comprising lines in the city and its suburbs. Toll service is generally understood to be any service rendered between separate exchange districts for which an extra charge is made.

A distinction is sometimes made between toll and long distance service—the latter being service between widely-separated points, while the former is usually between exchange systems which are closely adjacent. Long distance service is usually handled by a special force of long distance operators, while toll calls may be handled on local boards by means of what is termed the two-number method.

A large number of types and arrangements of equipment are used to form the various kinds of local systems, each type being especially designed to handle the traffic in a given community or district. The most common system in use in small towns and rural districts comprises a magneto switchboard in the central office, to which is connected lines radiating over the town and surrounding community to be served, and magneto telephones at the subscribers' stations.

For the most part, these lines are what are known as "bridging." A large number of subscribers' stations are connected to each line and so arranged that any subscriber on a given line can call any other subscriber on the same line without the assistance of the operator at the switchboard. This he does by means of a magneto generator in his telephone.

When the crank of the magneto is turned, all of the bells on the line are rung, the party wanted being notified by means of code rings. A single ring is ordinarily used to signal the operator when connection is desired with a subscriber on another line. The operator makes the connection desired and signals the party wanted, also by means of a hand generator and code ringing.

A power generator or ringing converter should be provided for the operator in all except the smallest offices where the traffic is exceptionally light. Most small magneto systems have a combination of code-ringing party lines and straight lines or lines on which but one subscriber is connected. Parties on straight lines must signal the operator for every connection desired.

On magneto systems, the subscriber signals the operator by turning the crank of the magneto generator in his telephone. This causes a drop shutter on the switchboard to fall, signaling the operator and indicating that her services are required.

An exception to this signaling method occurs in a system devised by the Leich Electric Co. in which a sufficient number of cells of dry battery are provided at the subscriber's telephone and are momentarily connected across the circuit, as the subscriber takes down his receiver, to display the calling signal before the operator. Talking current is supplied to the subscriber's transmitter by dry cells, located in the telephone.

The high cost of the magneto in the subscriber's station equipment together with the inconvenience of having to turn a crank to call the operator, and the disadvantage of having local batteries in the subscriber's telephone, brings this system into disfavor in modern practice for large exchange work, although for small system it is extremely desirable, owing to its simplicity of circuits and dependability. It is a well-known fact among telephone men generally that magneto equipment will operate fairly well over lines that cannot be operated with common battery equipment.

Besides the inconvenience of having to call the operator with the magneto the subscriber is also required to signal the operator again when he is through talking. This, of course, he will not always do and supervision on a magneto system is never entirely satisfactory for this reason.

Operators are required to continually supervise all connections by listening-in on the circuits to ascertain whether the called party has answered and whether or not the conversation is finished. This naturally increases her work and slows down the service.

In small switchboards, of not over two positions, each operator can reach all lines entering the office and can thus complete any connection from any line she may answer to any other line. As the system grows larger, what are known as transfer trunks are provided between non-adjacent operator positions by means of which operators may complete calls originating on one position and ending on a position that is out of the reach of the originating operator.

These trunks are usually nothing more than straight circuits ended in jacks at either end, with signals so arranged that they will be displayed at either end of the trunk when a calling plug is inserted in the opposite end.

A more satisfactory way to handle the calls on systems where there are more lines than one operator can reach, is to provide a multiple of all lines entering the office, within the reach of each operator. With this arrangement, the calling signal appears before an operator on one position and the line is looped into a multiple jack on other positions of the board where operators cannot reach the answering jack. The main advantage of the multiple over the transfer system is that one operator only is required to establish any connection. With the transfer system, two operators are required for each transferred call.

The introduction of the common battery system has greatly simplified operating problems and has made the operators' duties fewer and her work more accurate and rapid. The subscriber's part in securing a connection is made most simple, in that he is only required to lift his telephone receiver from its hook to signal the operator. The signal appearing before the operator may either be an electro-mechanical signal such as a switchboard drop or, as is more usual, a small electric light.

The cord circuits are equipped with automatic supervisory signals which enable the operator to know at all times whether the called subscriber has answered and when either party desires another connection. All that is required of the subscriber to attract the operator for a second connection, is to move his hook switch up and down and thus operate the supervisory signals in the operator's cord circuit.

A great variety of party-line systems have been devised and placed in operation, which enable the operator to ring any one of a limited number of parties on a line without ringing any of the other stations on the same line.

In one of the first systems devised, and one which is very satisfactory, the bells at the subscriber's telephone are connected from one of the two wires of the subscriber's line to ground. The ring-

ing current passes from the ringing machine over this one wire, through the ringer movement at the subscriber's station and returns by ground to the ringing machine.

When it is desired to ring the other party on the line, the ringing current is sent out over the other wire of the line to the bells of the second party, which are connected from this second wire to ground. In this manner, two separate grounded ringing circuits are provided, one for each subscriber, while both talk over the same metallic circuit to the central office.

The operator is always signaled over the metallic circuit from the telephone when the subscriber's receiver is taken down. In many of the older systems, a current-reversing key was used in the ringing battery leads on the operator's keyshelf. This was used by the operator as a master key in connection with any individual ringing key on the keyshelf to select the party desired, on any line. Later on, individual reversing keys were placed in each cord circuit with an indicating device to show which party was being rung on that individual circuit.

A high development of the two-party ringing system is found in the jack-per-station board. In this system, two calling jacks are provided in the multiple for each two-party line subscriber. The wires leading to the first jack are connected straight across the line while the wires leading to the second jack are reversed.

It is evident from this connection that, with the ringing current connected to a given wire (tip or sleeve) of the calling cord, if the plug is inserted in one jack the calling current will be sent out over one wire of the line and call one party, and if inserted in the other jack the calling current will go over the other wire and ring the other party, owing to the reversed connections on the jack.

It is also evident that these jacks may be given any numbers desired and that any reversed jack may be connected on the same line with any straight jack. Any jack may be connected straight or reversed at will. If jack numbers are assigned as subscribers' telephone numbers, it will never be necessary to change a subscriber's number when he is changed from one line to another.

Among other selective ringing party-line systems, perhaps the most widely used by Independent companies is what is known as the harmonic system, in which different frequencies of alternating current are used to ring the various stations on a line. The ringer movements of the different stations are tuned to respond to but one current frequency. Special ringing keys are provided on each operator cord circuit, which enables the operator to select the desired current frequency and thus ring the party wanted.

In other systems, direct current or direct pulsating current is used in connection with a polarized relay or ringer to accomplish the selection. Combinations of all of these systems have been made and are in use in many places today with a remarkable degree of success. The direct and pulsating current systems are used in magneto plants.

Various numbering methods are used to designate the desired subscriber on a party line. Where code ringing is used, an arbitrary code is sometimes established, with letters of the alphabet assigned to designate each ring in the code. The desired letter is then used as a prefix or suffix in connection with the line number for the subscriber's telephone number.

A less satisfactory system for designating code ringing is to assign numbers to the rings and give the subscriber a double telephone number separated by a dash, as for example 23-134. In this instance, 134 is the line number, while 23 represents a certain ring in the code which must be memorized by the operator.

One of the most satisfactory systems of numbering rural party lines, where the rural lines do not exceed 99 in number, is to use a four-digit number in which the first two digits represent the line number and the last two the ring on the line.

The code rings are comprised of long, or long and short rings in combination, with the long rings always first. No. 10, for example, represents one long ring; 11, one long and one short; 12, one long and two short; 13, one long and three short; 21, two long and one short; 23, two long and three short; 20, two long, etc. The first figure in the ring number always represents the number of long rings and the second figure the number of short rings.

One advantage of this system is that the information the operator wants first, the line number, is given first; the last two figures of the number representing the ring are given last and designate the ring to be given in such a manner that it is unnecessary for a new operator to memorize a ringing code.

In selective ringing systems either a figure or letter is usually used in conjunction with the subscriber's line number to designate a particular telephone on a line. Sometimes a name is used as a prefix or suffix in the same manner that an office name is used. Frequently also the name of a color is used, and the ringing keys on the operator's keyshelf are marked in corresponding colors. Where letters or figures are used, the ringing keys are also marked with corresponding letters and figures.

When a local system grows too large to be conveniently handled on one switchboard, a second board is installed, usually in a separate building, and calls are trunked from one office to the other. These calls are received on special trunk boards, termed *B* boards. The operators at these *B* boards do nothing but complete calls in one office that are originated in another office.

When a new branch office is established in a community which has formerly had but one office a very high percentage of calls originating in the new office will be trunked to the old office, while a low percentage of the calls originating in the old office will be trunked to the new office.

This holds true as a general statement, but in certain cases where there is a high percentage of community interest in the district covered by the lines entering the new office, the percentage of trunking between the two offices will be lower. From a purely traffic standpoint, branch exchanges should be located nearest to centers of community interest. Plant costs, however, make such a method of office location impossible in most cases.

As an exchange system grows and the number of offices increases, the percentage of trunking from the various offices also increases. In some offices in large cities as high as 90 per cent or more of all originating calls are trunked to other offices.

In some offices, built in recent years, it has been deemed inadvisable to build a switchboard multiple to take care of the low percentage of calls that were completed in the local subscribers' multiple by the *A* operators, therefore no multiple appears on the *A* boards at all. The *B* boards alone are provided with a multiple of all subscribers' lines entering the exchange and all calls are trunked by the *A* operators. We thus have what is termed 100 per cent trunking. One hundred per cent trunking is frequently used in temporary installations made to relieve an overloaded condition in an old plant until a new system or additional permanent facilities can be provided.

A part of local telephone work that has come into great prominence during late years is known as the "private branch exchange." It frequently happens that a business concern grows to such proportions that a large number of telephones are required in its several offices and departments. It is natural that many of the calls made from these various offices and departments will be for other offices and departments of the same firm. In other words, the community interest is very high.

Owing to this fact and also to the fact that the average customer in calling such a concern does not know just what department or official he should talk to, it is considered good practice to pro-

vide a private branch exchange switchboard on the property of the subscriber and to terminate all of the subscriber's telephone lines from the central office on this board. These lines are then known as trunk lines. As many telephones as are required in the various offices and departments of the customer are provided on individual lines connected to the P. B. X., where connections are established by a P. B. X. operator, who is usually hired by the customer of the telephone company.

Owing to the high community interest within the various departments of most business concerns, the majority of their calls will be completed on their own switchboard, thus using only a small number of the trunk lines to the central office that would be required without the private branch exchange.

The P. B. X. operator acts as the doorkeeper to the institution, answering all calls coming in from the telephone office and seeing that each calling customer is connected with the proper department or individual. The P. B. X. operator fills a very important place in any business concern and her selection and training deserve a great deal of attention.

In smaller institutions where the expense of an operator cannot be justified, what is known as an "intercommunicating system" is provided. The intercommunicating system is usually limited to two trunk lines and six or eight telephones.

Push buttons or switches are provided at each telephone, by means of which the subscriber may connect his telephone to either trunk line or to any telephone on the intercommunicating system. This necessitates a pair of wires from each telephone to every other telephone on the system, and also that all trunk lines be wired to each telephone. A small cable, usually lead-covered, carries all wires between telephones on the subscriber's premises. Arrangements are also made whereby any telephone on the system may be rung from any other telephone.

This system gives speedy service and is easily operated by the subscriber, but is more subject to equipment trouble than some other types of equipment. In fact, while intercommunicating systems are in favor with most subscribers, they are not greatly in favor with the telephone operating companies.

In some cities all charges for telephone service are made on a measured service basis. The establishment of measured service in any exchange usually reduces the calling rate 50 per cent or more. A great deal more work per call is required of the operator in furnishing measured service than when unlimited service is given.

One of the best measured service systems is that which makes use of a coin collector, the subscriber being required to deposit a coin to call the operator. With this system a mechanism is provided whereby the coin is returned to the calling party should it be impossible to establish the connection desired.

In another coin-collector system, the operator is called in the usual way. After the operator ascertains the number of the desired party and obtains an answer from him, the subscriber is required to deposit a coin before the connection is completed.

Various devices are in use in such coin collectors or pay stations, which enable the operator to determine the denomination of the coin deposited. The most common of these is the sound of a bell or gong, which is struck by the coin as it drops into the receptacle. Where a coin collector is not used, the operator is required to make a ticket of the call, much in the same manner that two-number toll service is handled. Recently systems of call meters have been devised for measured service with varying degrees of success.

Early in the history of telephony, engineers began to turn their attention towards the development of means whereby subscribers would be enabled to secure their connections without the aid of an operator. The advantages of such a system for local work are apparent to even the casual observer. While many of the first attempts to produce an automatic or machine-switching telephone system were very crude, the development of the art has reached the point where it stands today an efficient and practical system.

What is generally termed an "automatic system" is any system in which the subscriber, without the assistance of anyone else, is enabled to secure a connection with any other subscriber on the system.

It is only natural that any system which is such a radical departure from standard telephone practices should meet with opposition among certain groups of telephone men. Many of the enemies of the automatic claim the subscriber should be served instead of being compelled to serve himself. Their main argument is that every possible operating detail should be taken from the subscriber and supplied by the company's employes.

Those arguing in favor of the automatic system contend the subscriber would rather be burdened with the extra details of operating the automatic telephone than be compelled to wait the will and pleasure of some one else to do it for him, and then probably have it done wrong.

It is not our purpose to enter into the discussion, but instead to explain what the automatic system is and how it is operated. From the subscriber's standpoint, the sending mechanism on his telephone is, perhaps, the most important feature of the system.

Various devices have been employed at the subscriber's station to enable him to operate switching mechanism located in the central office. It is obvious that it is desirable to provide a mechanism at the subscriber's station which may be operated with a minimum amount of effort on the part of the subscriber. Speaking generally, the less the subscriber is required to do, the more satisfactory is the service.

A dial has been adopted almost universally at the subscriber's station for a sending device. Five or six seconds are required to dial the average automatic number. Automatic ringing induction, busy-back, and out-of-order tones are provided to inform the subscriber of the condition of his call. Automatic ringing control and automatic disconnect are also provided. In fact, the automatic telephone system will do practically everything that a manual system will do. The secrecy of the system is one of its best features.

Another system which has recently claimed a great deal of attention is termed the semi-automatic or automanual.

In this system the switching is done entirely by means of automatic switching mechanism in exactly the same manner that it is done in an automatic plant. The subscriber, however, is not required to manipulate any sending mechanism to secure his number, but instead takes down the receiver of his telephone and gives the number to an operator in the regular way. The operator is furnished with a special selecting mechanism, by means of which she sets up the desired connection.

The advantages claimed for this system are that the subscriber is required to expend the least possible effort in obtaining a connection. The operators becomes highly skilled and accurate in their work and the total number of errors is small. The sending mechanisms all operate at a uniform speed and over uniform lengths of circuit. In fact, the advocates of this equipment claim the majority of the advantages of both manual and machine-switching systems and but few of their disadvantages.

Only a fraction of the number of operators required to handle a full manual system are required for semi-automatic.

There can be no question but that there is a type of equipment which is best adapted for every specific requirement. Each and every exchange is a problem in itself that must be worked out separately. Physical requirements, as well as traffic requirements, together with costs and rates that can be obtained for the service, must all have the most careful consideration before any type of equipment can be recommended for any given office.

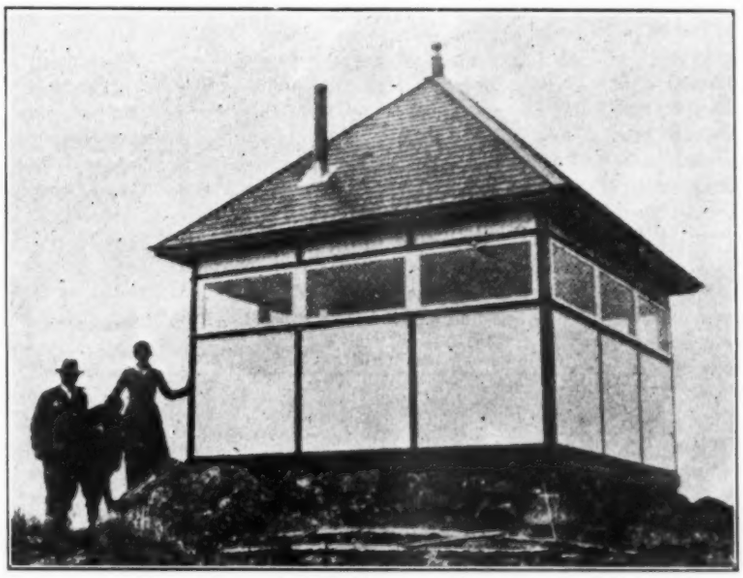
The Telephone in Forest Protection

The Leading Role in a Forest Protection System Is Taken by the Telephone—It Is Not Only Reliable and Rapid, but Comparatively Inexpensive to Operate—A General Analysis of the System Reveals Interesting Facts

The vast forests of the United States and Canada, the necessity for their adequate protection and the protective measures adopted by the various governments constitute not only an interesting, but an almost inexhaustive subject in which telephony plays no small part.

One of the prime essentials in the organization of protection—that is fire protection—is a reliable means of rapid communication linking all points within the forest with those outside of it and linking each division of the protection staff with every other division.

Particularly in a large fire it is important that the officer in charge be kept constantly informed of the progress of the fire throughout the section under surveillance and of the measures that are being taken for its control. Often a scout or intelligence officer is employed whose duty is to keep the chief of the fire-fighting forces informed of the progress of the work. This individual also takes care of the establishment and maintenance of communication with headquarters in the rear, as a fire camp is seldom located on a permanent telephone line. So the patrolmen, lookout men, "smoke chasers," and the many other control units require intercommunication facilities.



Lookout Station on a Dominion Forest Preserve in British Columbia.

An analysis of communication requirements has revealed that most of the messages to be sent are long and involved in character and that the longer and more intricate messages have to be transmitted over great distances—in few cases over very short distances. Where short distances are involved, there are generally two classes of messages to be transmitted, and the longer distances vary on an average from 10 to 40 miles, with 100 miles as a usual maximum.

Taking into consideration the kind of messages, the men who send them and the range over which they travel, the telephone was found to be the only medium which met all requirements well enough to form the basis of the system.

Communication by telephone is rapid, adapted to intricate messages, requires no skill to operate, and gives service at a comparatively low cost. And so, although other methods of communication are used to some extent, the telephone forms the basis of the entire system of intercommunication and, as a result, equipment and methods of construction particularly adapted to forest protection purposes have been developed and employed. There are now more than 30,000 miles of such lines in successful operation in the United States and nearly 2,000 miles in Canada.

In the development of a telephone system for forest protection before construction is started, a carefully drawn plan of the proposed system is made, as the longer the line and greater the number of instruments attached, the greater must be the electrical conductivity of the wire used and the higher the resistance of the ringer coils in the instruments.

An independent pole line 12 to 15 miles in length on which six to eight instruments are to be placed may be constructed of No. 12 gauge galvanized iron wire and 1,000-ohm ringers employed. If the same line is to form part of a 100-mile circuit No. 9 gauge wire is necessary and 2,500-ohm ringers give the best results.

Very long lines sometimes require No. 6 iron wire or it may be necessary to resort to copper which, as is generally known, has approximately six times the electrical conductivity of iron wire of the same gauge.

This may radically alter construction methods, so it is considered most important to give all probable future extensions careful consideration so that no type of construction or equipment employed will prove unfitted to form part of a more extensive system.

The following data is collected, prior to the construction: Boundaries of tract, boundaries of ranger districts, location of supervisor's headquarters, location of district ranger headquarters, location of primary road and trail systems, location of primary lookout stations, and location of existing telephone lines in or near the tract.

Two principal types of construction have been employed. These are pole lines and tree lines. Pole line construction, as used in forest protection, does not differ very much from ordinary rural-line methods. Briefly stated, it consists of poles of a specified length set firmly in the ground at specified, uniform intervals and bearing glass or porcelain insulators to which the line wire is rigidly attached by short tie wires. Pole lines are as straight as possible. On curves the wire is always placed on the convex side and the sag between poles is only sufficient to allow for the normal contraction of the wire with changes of temperature.

Tree-line construction, however, is very different from pole line construction. In most important aspects, it is, in fact, the exact opposite of pole-line construction.

It consists of trees of varying sizes at varying, but as nearly as possible, equal distance apart, trimmed of branches on one side to a specified height above the ground, and serving as supports for a special two-piece porcelain insulator through which the line wire passes without being rigidly attached.

Tree lines are never straight as are pole lines. On curves the line wire is always placed on the concave side and there is very much greater allowance for sag than that required for normal contraction of the wire. Supports on three lines are generally about 65 per cent greater in number than on pole lines, and sag allowance is from four to six times as great.

Pole lines are built in open country and along cleared roads, or, if they must

be carried through timber at a sufficient right-of-way to insure that trees will not fall across the line. They are built rigidly and the wires are expected to stay up unless the poles themselves give way.

Tree lines are designed to be built only through standing timber, where no attempt is made to clear a sufficient right of way to insure against falling timber. Instead, special construction is used for the purpose of insuring that when trees fall across the line, the line will be carried to the ground without breaking, or, in case a number of trees fall in a short distance, the tie wires will break and a considerable portion of the line wire be brought to the ground still unbroken.

A further danger that tree-line construction overcomes arises from the swaying of the supporting trees in the wind. This does not occur in pole lines, but is obviously a matter of importance in tree lines. Tree lines are designed to give way and fall to the ground when subjected to unusual strain by falling timber, but any breakage that occurs is designed to come in the tie wires and not in the line wire.

The underlying principle is that a broken line wire means a dead circuit, but a line wire of a grounded circuit may still function as a telephone circuit when a large part of it is on the ground, or even when buried under dry snow. If the ground is damp, it will function very imperfectly and if it lies in a stream or pool of water it is no better than a broken wire but a considerable circuit may lie on ordinary dry or frozen ground without entirely destroying the usefulness of the line for telephone purposes.

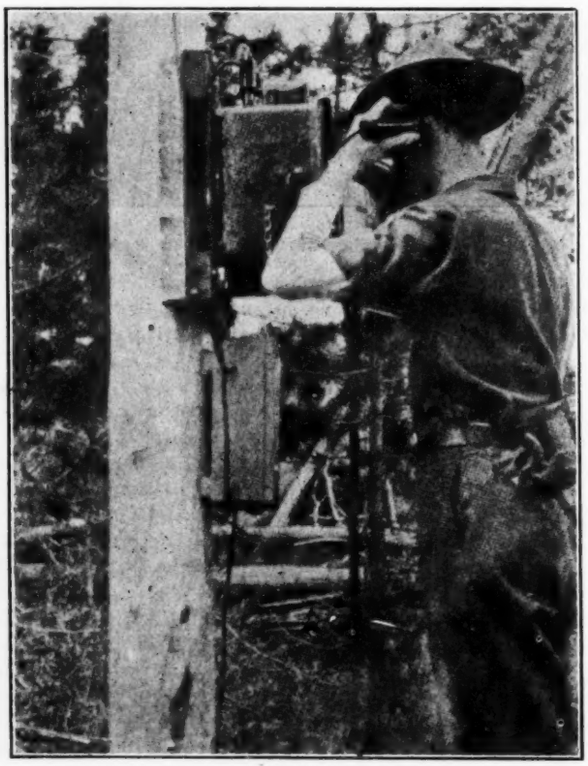
Tree lines have definite limitations. It is considered impracticable to use copper wire with this type of construction. This limits the length of tree line to about 125 to 150 miles, using No. 9 iron wire. If it is necessary to build a metallic circuit to insure against induction, it is not practicable to attach both wires to the same supports, as is done with pole lines, but two separate parallel lines must be built.

Tree lines are never as perfectly insulated as are standard pole lines and, therefore, more subject to losses of current and other difficulties in transmission. This is true, no matter how well they are built and is inherent in the methods and line equipment employed.

Even where there are sufficient trees available to furnish supports for the line, a tree line is not necessarily cheaper than a pole line. The cost elements of pole-line construction that are greater than those of tree-line construction are the cost of the poles set on the line and the cost of right-of-way clearing. All other costs are liable to be higher for tree-line construction.

It is considered inadvisable to use smaller wire than No. 9 B. W. G. iron wire on a tree line. On a pole line, however, No. 12 B. W. G. iron wire may be used on circuits up to 25 to 30 miles in length. This is approximately one-half the weight of No. 9 and both the first cost and cost of transportation are, therefore, reduced one-half. There are nearly twice as many ties on a tree line as on pole lines, and the cost for insulators is, therefore, considerably increased. As split-tree insulators generally cost more per thousand than pony glass insulators and brackets together, this cost is more than doubled on a tree line. Stringing wire costs materially more on tree lines than on pole lines, even with the most experienced labor.

Where a large mileage of line is to be built in big timber, or where the line passes in large part through large fire-killed, dead or overmature timber where windfalls are frequent and the cost of right-of-way clearing would be prohibitive, tree-line methods are often the only practicable construction that can be employed.



Lookout Station Telephone Set Installed in the Field.

The types of timber most favorable for tree-line construction are those with little or no underbrush and only moderately dense stands of trees of small size (10 to 15 inches in diameter at breast-height), with trunks clear of branches to a height of 20 to 25 feet or with only small pin branches, and with thin, tough bark.

To these belong the lodgepole pine stands of the West, which are said to be the most favorable of all stands for tree-line work, and the jack pine stands of the East. Somewhat less favorable are the stands of eastern red pine, of western larch and western yellow pine in mixture, Douglas fir on the drier soils, and some of the larger-sized pure poplar stands both East and West.

Next to these in ease and low cost of tree-line construction are such stands as Western white pine (where relatively pure) Eastern white pine, mixed hardwoods in the East, Englemann spruce and amabilis fir at high elevations and the larger-sized Western yellow pine and Douglas fir on dry sites.

The most difficult types through which to build are Douglas fir on wet sites on the Pacific coast, white spruce or red spruce, Englemann spruce at low elevations, cedar, and above all, hemlock, especially Western hemlock. The mixed coniferous forests of the moister regions of British Columbia come under this head, as well as a great deal of the northern forest belt and eastern spruce forests.

The large amount of underbrush that has to be cleared, the density of the timber, and the low-branching habits of these species make them difficult. Hemlocks are particularly bad because the lower branches are excessively long and have a very pronounced downward sweep.

In building lines through very young timber, there is often no choice left as to the type of construction, as some of them are large enough to serve as supports. Often standing dead snags are utilized, but their use in long lines is not advisable. When they are used, care is taken to see that as many as possible of the dead trees adjacent to the line are felled, that abundant slack is left in the line, and that it is made easily accessible for the purpose of repairs.

If young timber of such a size that trees large enough to furnish supports are available, is encountered, consideration is given to the advisability of pole-line construction. When the young stands are very open, pole lines are usually preferred. A makeshift construction sometimes adopted consists in making the necessary right-of-way clearing, often in the form of wagon road, but leaving at the required intervals, suitable trees to serve as the supports of the telephone line. These trees are not topped. The cost of making and setting poles is saved, but a line thus located is likely to interfere with the use of the road and provision for replacing

these supports with poles must be made part of the work of line maintenance.

In regard to dead standing timber, this is the most troublesome kind of stand through which to build and maintain. Whenever possible, such timber is carefully avoided, even at the expense of materially lengthening the line.

For forest protection purposes a grounded line is nearly always preferable to a metallic line. Only grounded lines, it is said, can be satisfactorily employed in tree-line construction. The employment of two wires not only magnifies the chance for interruptions, due to breaks in the line, but also renders a metallic line liable to interruption from short circuits in ways that do not occur with grounded lines.

Thus, if the two wires become crossed, as would often happen when a tree fell across the line, or if a wet branch or a loose tie wire fell across both wires, the line would fail to work. Metallic circuits are as a rule used on full pole lines and then only when needed to counteract interference from induced currents. Where disturbances due to induction are encountered in only a part of a line, it is not necessary to make the entire line a metallic circuit, but only that portion where the disturbance occurs.

In Canada the connection of privately-owned instruments with forestry branch lines is not permitted, and the conditions under which these lines are constructed and maintained necessarily reduce to a minimum the number of telephones that may be operated on them. All instruments connected with a forestry branch are provided, installed and maintained by it.

The telephone lines of the forestry branch are not to be considered commercial in character. Hence no action, such as the granting of telephone services to settlers along these lines, with an annual charge for the privileges is permitted. The lines, however, are open for public use free of charge so far as the portion of the line owned by branch are concerned. Where provincial or other foreign lines are used in connection with a forest line, the usual toll charges are made.

In the line construction of the forestry branch, several factors combine to make the adoption of equipment standards imperative, and only by adopting a standard type for all circuits is it possible to connect adjacent ones or transfer equipment from one to another.

For providing uniform equipment throughout the Canadian forest reserves, a list has been adopted from which there must be no deviation without the authority of the district inspector. The list includes materials such as wire, poles, and attachments and their uses, and a description of the equipment.

The relation of the line to the telephone system, present and proposed is kept constantly in mind. This influences the type and character of construction. If the line is to be a trunk line the possibility of connecting to it short branch lines from lookout points and ranger and fire stations is taken into consideration.

The following points are also observed in locating telephone lines:

(1) The location of the most logical switching centers for connection with lines.

(2) Topographical location—by avoiding steep slopes, cliffs, high divides, riverbeds, coulees, streams and canyons more than 500 feet in width, the danger from snowslides, landslides, floods and high winds will be lessened. By following roads and main trails, frequent inspection is facilitated and maintenance simplified.

(3) Location of other electrical circuits. Electric light, power and high-tension transmission lines are avoided whenever possible. A high-tension transmission line carrying over 5,000 volts should never be paralleled at a distance of less than one-half mile and all crossings and approaches between telephone and power transmission lines should be at right angles.

(4) The probabilities of future growth and extensions.

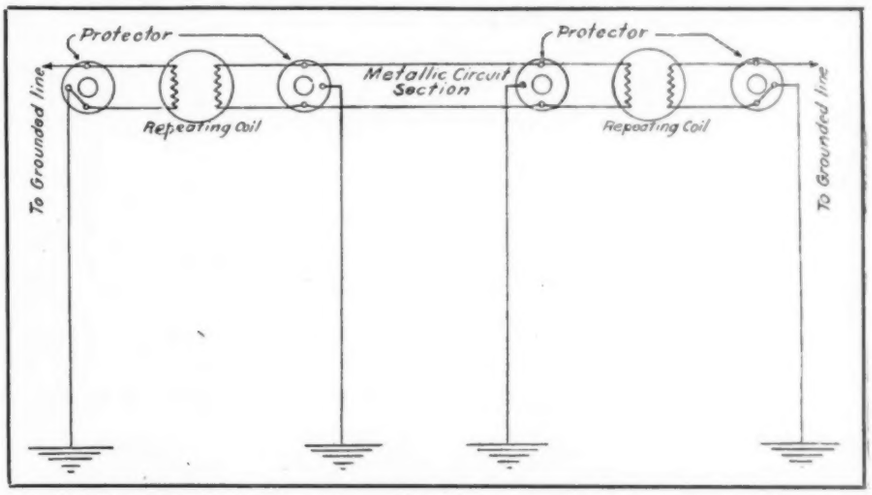
(5) The length of the line. Other costs being equal, the cost of construction and maintenance varies as the length of the line.

All line materials are distributed along the right-of-way well in advance of wire-stringing crews. It is often necessary to pack wire on horses and this is done in several ways.

One method is to run a cross-stick lengthwise between the cross-trees on the pack-saddle, tying each end securely. Then the coil of wire is split in half and placed over the top of the stick connecting the cross-trees, so that one-half of the coil is on each side of the saddle. Finally a diamond hitch is thrown over the whole.

Another method is the use of a packing cradle, consisting of a rectangular wooden frame built to fit snugly over the forks of the pack-saddle. In regard to fixed equipment the standard wall telephone set is the most common type employed, as it is used for nearly all permanent indoor installations, except at lookouts or main headquarters where desk sets are desirable. For temporary equipment the portable sets of different types are employed.

The entire line must be gone over thoroughly at least once a year, usually before the beginning of the fire season. Each pole is inspected, brackets, insulators, and the tie wires which are broken are properly replaced, and all foliage and interfering timber is cleared away. Poles are examined for butt-rot and for twist. In the latter case it is determined whether the pole has twisted to an extent to permit the line or tie to touch it. Loose guys or braces are tightened and all loose or badly-corroded joints renewed.



A Metallic Circuit Section in a Grounded Line to Overcome Induction Disturbances.

Inspection of telephone lines is made regularly during the first season, and special inspection made by the ranger or other officer in charge immediately after a severe wind, snow, sleet, or electrical storm, and after fires.

Rangers and guards, when on patrol duty, watch the telephone lines, cut any trees that may have fallen across them, and make any other necessary repairs. Tests are made at a specified hour each morning during the fire season to see that no trouble exists. Each forest supervisor establishes a regular organization on his reserve for the proper inspection and maintenance of each branch line.

Date Set for Municipal Electricians' Convention.

It is announced that the 26th annual convention of the International Association of Municipal Electricians will be held at Colorado Springs, Colo., September 6 to 10. The organization issues an invitation to members to prepare to make this a vacation combined with the business of the association.

Those Who Know Automa

The general manager of an operating company which has been using Strowger Automatic equipment for the past five years, was sincerely opposed to installing this apparatus in his main exchange—*before* it was adopted.

Being over-ruled in his opinion, he honestly endeavored to "make the stuff work," and today, after five years' experience, he is equally sincere in declaring—

"If I had known five years ago what I now know about the Strowger Automatic, I would never have opposed its installation in our main exchange."

These are not mere words, for during the past three years this company, *acting upon this man's advice*, has installed two more Strowger Exchanges.

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New York City
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Cleveland
415 Cuyahoga Bldg.

Philadelphia
The Bourse Bldg.

Columbus
516 Ferris Bldg.

445 T

ASSOCI PA

INTERNATIONAL TELEPHONE SAL INE

International Automatic Telephone Company, Ltd., London

Compagnie Francaise pour l'Exploitation des Proc ous

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

a Best—Recognize It As Best

So, too, today, there are men who, being unfamiliar with the results obtained through operating Strowger Automatic equipment, are sincerely doubtful of the value it would have in their exchanges.

If you are among those who doubt, we say to you: "Those Who Know Automatic Best, Recognize it as Best."

Our augmented staff of field engineers are ready to lay before you facts and cases—not isolated instances, but hundreds of exchanges among which you will find conditions very similar to your own—by which you can judge accurately as to just what the Strowger Automatic System will do for your company.

Whether you operate a multi-office network, a single office, 3,000-line system, or a small town exchange of a hundred or so stations, the Automatic will bring you improved service, reduced costs and better profits.

Our increased factory capacity insures prompt deliveries of equipment for all types of service.

CTRIC COMPANY

ES: CHICAGO, ILLINOIS

CES:

Rochester 612 Mercantile Bldg. | Detroit 525 Ford Bldg. | Pittsburgh 608 Fulton Bldg. | Kansas City 1001 New York Life Bldg.

PANIES:

NEERING CORPORATION, New York

ouston, Paris | Automatic Telephone Mfg. Co., Ltd., Liverpool | Automatic Telephones, Australasia, Ltd., Sydney

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

1129. What selection is accomplished by the rotary steps of the first selector switch shaft in the arrangement shown in Fig. 320? In what way, if any, does this differ from the selection accomplished when the first selector switch in the system previously described under "Mechanical Switching" takes the vertical steps? What is an essential as to the motion of the switch shaft if the trunk associated with the first bank contact of the row is not available? After the switch shaft has taken the first vertical step into the row, is the vertical motion under the control of switch-driving current impulses from a distant point or is it automatic? What is the distinction between the switch wipers, 2 and 3, and 4, and 5, Fig. 320,? How are the banks arranged before which the wipers of the switch shaft pass? What is a rough equivalent for the operating functions performed by test wipers 4 and 5? In what way do the test wipers, 4 and 5, together with the test bank contacts over which they may be passing control the vertical motion of the switch shaft?

1130. How is it possible for the trunk associated with any given set of bank contacts to be made by being seized *at another bank* by another switch? In what way does the release of relay J interrupt the vertical travel of the switch shaft, *provided the test-bank contacts* over which test wipers 4 and 5 are passing *are not* connected with the positive or grounded terminal of the common battery? Under what operating conditions will the test-bank contacts be connected with the positive or grounded terminal of the common battery? When the test-bank contacts over which wipers 4 and 5 are traveling are connected with the positive or grounded terminal of the common battery, how is the vertical travel of the switch-wiper shaft maintained? When will the vertical travel of the switch-wiper shaft be arrested? What is the function of relay *I*, Fig. 320?

1131. How is the selection interposed between the primary trunk and the operator's equipment initiated? What is the obvious operating function of slow-acting relay *H*, Fig. 320? When, relative to the movement of the switch-wiper shaft, is slow-acting relay *H* operated?

1132. When is relay *F* operated? What is the reason for disconnecting the equipment from talking circuit wipers 2 and 3 *when they are passing over the talking circuit-bank contacts of busy trunk circuits?* How is this accomplished? When is relay *I* released?

Chapter XXXIII.

Operating Combinations Including Switches. (Continued.)

1133. *The completed first selector operation.*—When the test wipers, 4 and 5 in passing over the test-bank contacts, reach test-bank contacts associated with an available trunk circuit, relay *I* Fig. 320 is released.

The release of relay *I* occurs because the operation of relay *J*, following the upward movement of the armature of the vertical magnet *L*, has interrupted the energizing circuit by withdrawing one connection with the positive or grounded terminal of the common battery and because the test-bank contact of a *non-busy* trunk to which it is connected, does not afford another in its place. For these reasons, the locking circuit of relay *I* is interrupted and is not again restored while its armature is released.

The release of relay *I* interrupts the flow of current through the winding of relay *F* with the result that the two conductors of the first selector trunk, reserved for the talking circuit, are extended back to the opened normally-closed contacts of relay *E*.

In the initial manipulation connection with the positive or grounded terminal of the common battery and wire 3, Fig. 320, is established causing relay *E* to be operated. The operation of relay *E* interrupts both conductors of the trunk circuit toward the calling subscriber and, since it is operated prior to the beginning of the series of switch-driving impulses prevents the sound due to such current impulses from becoming noticeable.

It is obvious that relay *E* must have been operated prior to the beginning of the series of switch-driving impulses as the circuit to the winding of relay *K* is incomplete at its normally-open make-

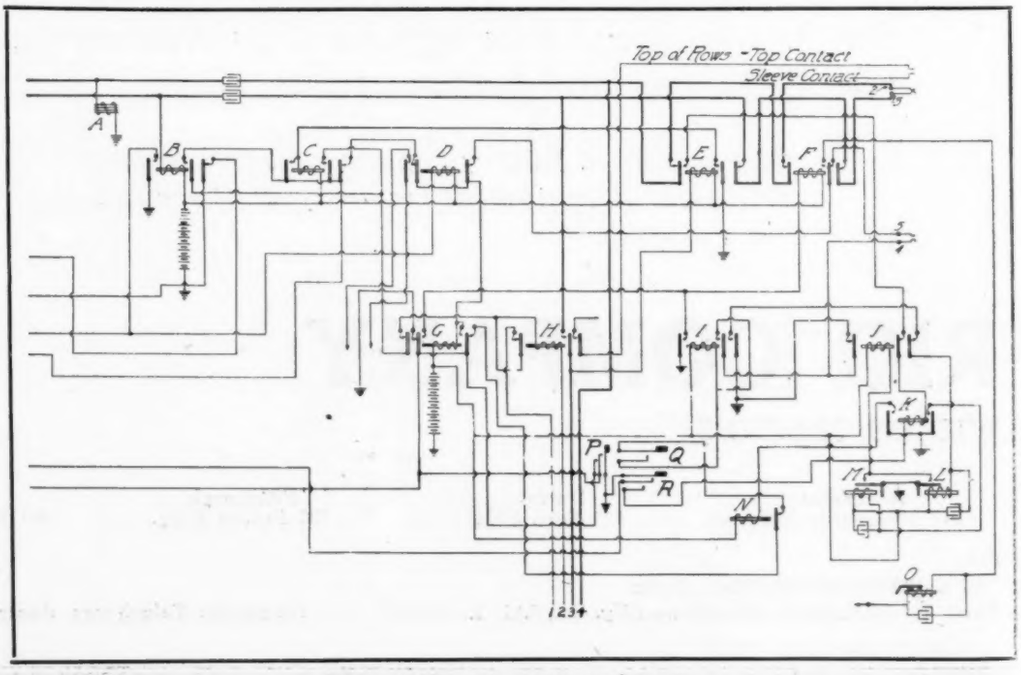


Fig. 320. The First Selector Circuit.

and-break contacts otherwise. It is also obvious that while relay *F* is released when the first series of switch-driving impulses cease and the automatic available trunk selection for the first group is complete, that relay *E* remains in the operated position.

1134. *The second selector operation.*—After the test wipers of the first selector Fig. 320, have reached the test-bank contacts associated with an available trunk circuit, the second series of switch-driving impulses is started. Beginning at the operator's equipment, these switch-driving impulses pass over wire 4, Fig. 320, through the normally-closed make-and-break contact of relay *E*, the normally-closed break contact of relay *F*, the wiper, 2, the bank contact 6, Fig. 321, on which wiper 2 is resting, the vertical off-normal contact *K* of the intermediate selector, Fig. 321, the normally-closed break contact of relay *L*, the winding of relay *A* and the connection with the positive or grounded terminal of the common battery.

The first switch-driving impulse passing over this circuit will cause relay *A*, Fig. 321, to be operated with the following results:

Starting at the positive or grounded terminal of the common battery, current will flow through the normally-open make contact of relay *A* (now closed), the winding of slow-acting relay *B*, and the common battery.

As a result, the armature of slow-acting relay *B* is operated and will be retained in the operated position throughout the second series of switch-driving impulses although the armature of relay *A* will be intermittently released. At the same time, the operation of relay *A* completes the path for a flow of current through the winding of the rotary magnet coil traceable as follows:

Starting at the positive or grounded terminal of the common battery, the current pases through the normally-open make contact of relay *A* (now closed), the winding of the rotary magnet coil *C*, and the common battery.

When the rotary magnet coil is energized, the switch shaft and wipers are rotated one step and an energizing circuit, is completed through the winding of relay *L* and the normally-open make contact of the rotary magnet armature. The operation of relay *L*, as a result of the closing of this normally-open circuit interrupts the circuit through the winding of relay *A* over which the switch-driving impulses are passing. The armature of relay *A* is released and the rotary magnet armature resumes its normal position in readiness for the next impulse.

The operation is repeated until the switch wiper shaft has taken the required number of rotary steps to place the wipers 2, 3, and 4, 5, in line with the bank contacts associated with trunks in the group to be selected, at which time the series of impulses received from the first selectors, Fig. 320 is discontinued and slow-acting relay *B*, Fig. 321, is released.

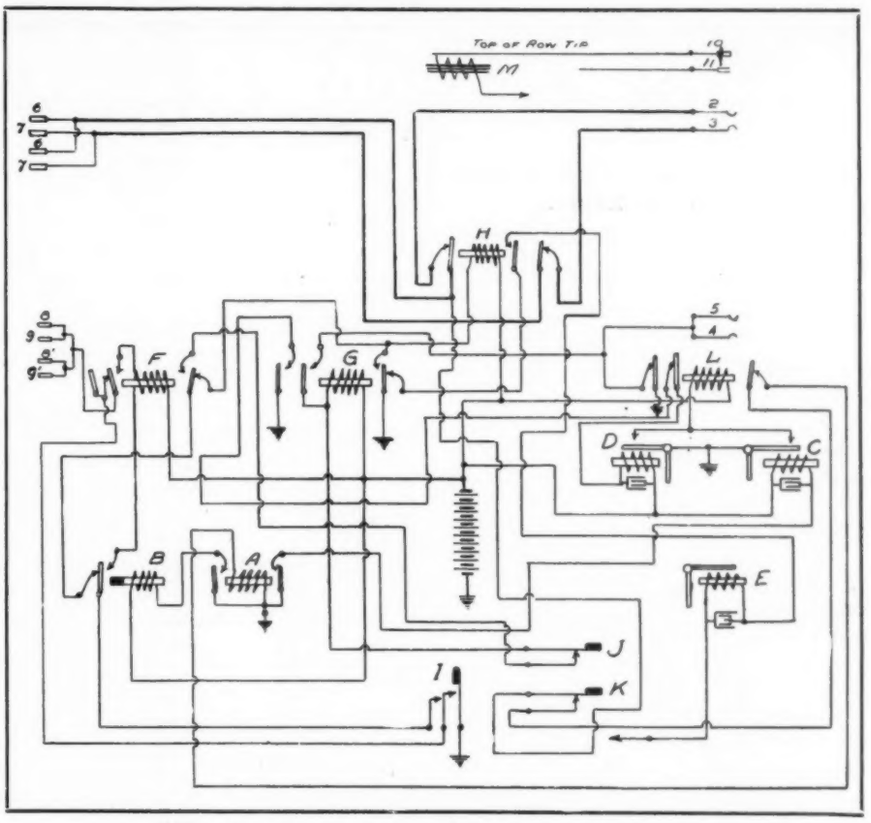


Fig. 321. The Intermediate Selector Circuit.

1135. *Guarding the trunk from intrusion.*—At the instant that the first selector equipment, Fig. 320, has completed the seizure of the trunk circuit bank contacts, 6, 7, 8, and 9, Fig. 321, the test wiper 4 of the first selector establishes a connection between the positive or grounded terminal of the common battery and test-bank contacts on which it is resting.

This connection is established by the closing of the normally-closed break contact of relay *I*, Fig. 320, and *prevents* the intrusion of another first selector switch on the same trunk circuit *after* the trunk bank contacts have been seized and before the intermediate selector, switch-wiper shaft, Fig. 321, has been moved in the rotary sense. The first step taken by the intermediate selector switch-wiper shaft will operate the rotary off-normal spring contacts *I*, Fig. 321, and will, by this means, establish another connection with the positive or grounded terminal of the common battery and the test-bank contacts, 8, and 9, Fig. 321, through the normally-closed make-break contact of relay *F*.

The operation of slow-acting relay *B* causes the immediate operation of relay *F* but the connection between the positive or grounded terminal of the common battery and the test-bank contacts 8 and 9 is maintained through the normally-open make-and-break contacts of slow-acting relay *B* (now closed), the normally-open make-and-break contact of relay *F* (now closed), and the rotary off-normal contact *I*.

It is also to be noted that relay *F*, Fig. 321, will complete a locking circuit through its own winding, the normally-open make-and-break contact (now closed), the test-bank contact 9, the normally-closed contact of relay *J*, Fig. 320, and the common battery. In other words, relay *F*, Fig. 321, will be retained in the operated position as long as the first selector test wipers *rest upon the test-bank contacts* of the trunk circuit with which it is associated.

(*To be continued.*)

Successful District Meeting at Peoria, Ill. August 10.

A very profitable district meeting was held at Peoria, Ill. on August 10 by the Illinois Independent Telephone Association.

A discussion of general publicity methods developed, and practicable, workable, inexpensive plans were described, such as every telephone company should be able to place in operation. One delegate described an essay contest which eliminated public hostility, attracted attention to the telephone industry, and cost less than $75. Such a contest ought to be within the reach of every telephone company, large and small.

What Is Your Company Doing?

Chats About Company's Doings.

By Stanley R. Edwards.

Celebrating the installation of more than 25,000 telephones in Los Angeles within the last six months, 2,000 employes of the Southern California Telephone Co. and their families enjoyed a picnic August 13 at Brookside Park, Pasadena.

The picnic program included ball games between picked teams of the Telephone League, athletic events of all kinds, bathing beauties and pole-climbing contests.

President A. B. Cass captained the losing team in a tug-of-war between the officers and the men and attempted to beat Charles Paddock's record in the 100-yard dash. The Paddock record, however, still stands.

The American Legion Band and the telephone company's jazz orchestra furnished the music. Community singing was directed by Gage Christopher and the following composed the committee in charge: E. F. Bontty, G. M. Brinkman, E. A. Bevan, J. T. Cryan, W. H. Fairbanks, D. W. Hanger, J. P. Hennessy, William Hughes, V. McMillan, W. F. Snyder, W. S. Whittaker and J. Woods.

A novel and startling demonstration of a Willys-Knight motor car has proved one of the most mystifying of modern mechanical feats in Toledo, Ohio. The car is known as "The Car That Speaks for Itself."

The first demonstration of this specially-equipped Willys-Knight created a small furore. It was parked in a busy thoroughfare and gave slight indication that it was other than a stock Willys-Knight such as is owned by hundreds in the city where the car is built. The hood had been removed, being replaced with a glass covering and motor being illuminated with small electric lights. The motor was running, the slight hum of the whirling fan being the only evidence that the explosions were taking place steadily and continuously in the four cylinders.

Then, as pedestrians halted to marvel at the quietness of the running motor, a voice came from the radiator. "I am the Willys-Knight motor. I improve with use. My sleeve valves move silently in a film of oil, no clashing parts bring noise and wear and need for readjustment. And because I am a silent motor it is easy for you to hear my voice even above the noise of the passing traffic."

Then in even tones it continued to tell a story of its many accomplishments. Now and again it paused to ask questions of its auditors, especially those who were owners of Willys-Knight cars.

The voice of the car easily was heard above the roar of the street traffic. At first it was thought that a "canned" speech upon a phonographic appliance was used—but when the car began to ask questions of those in the crowd and to speak to passersby by name, it became clear that someone by the use of invisible equipment was cutting-in on the conference.

Of course, the loud-speaking telephone was a part of this equipment connected by either wire or wireless with a nearby unseen observer.

The advertisement of the National Surety Co., reproduced on this page, published in the New York Times, must

Good Telephone Service!
Some months back the telephone service in New York was poor. By reason of the many hundreds of calls we received daily for bonds and burglary insurance, our patrons were subjected to many annoyances. It was not the fault of the Telephone Company; it was due to conditions arising out of the war and the signing of the armistice! Fortunately this situation has changed and it is our pleasure to tell our patrons that the service now is excellent. It is also a pleasure to give public expression to our views regarding telephone service today, which we regard without any question the best telephone service in the world! We believe we get more for our money out of the telephone service than we get out of any other commodity or service that we purchase, with the exception of newspapers. We think newspapers give us more value for the price of the papers than anything else in the world!
WE sell the best protection against embezzlement and Burglary at minimum rates.
Get the best.
National Surety Company
115 Broadway, New York
TELEPHONE—Rector 8800
World's Largest Surety Company

It's Fine to Have Subscribers for Boosters.

have cheered up the operating officials of the New York Telephone Co.

The advertisement occupied a space a little over six inches square, large enough to be easily seen and read. It shows that some business men not only appreciate their telephone service, but are anxious to let others know they do.

The other day a newspaper clipping from a rural county paper near Kansas City came into the office. The clipping contained a report from the chairman of a telephone project committee to the members of the county farm bureau.

The position taken by Chairman Thompson, of the committee, is so entirely different from anything that we have seen before that it is worthy of mention. If all farm agents would take the same view in regard to telephone service as does Mr. Thompson, it would mean the general betterment of that class of service.

Here is the clipping:

"Fellow members of the Clay County Farm Bureau:

As chairman of the telephone project, will say that I could report much grief from various localities in the county with but little advancement towards correction of the vexatious problem.

We have gone into the matter cautiously and have attempted to establish an organization with power to act in considering the problems to be corrected.

This we consider necessary in order to obtain the proper relative standing with the companies in negotiating for better service.

We find that the unsatisfactory telephone service given by the various exchanges is due to a number of causes. Some will be easily corrected while others will take considerable time.

With some exchanges, the lines extending into the country are owned by the telephone company, and in others the country lines are owned by the farmers; a joint partnership which I believe cannot give good service. No one seems to take the responsibility for keeping up the lines.

We consider this the greatest cause for grief we have. The country lines and the exchanges should be operated as a unit plant. The company should own and maintain the entire system, charging a fixed rate per annum and then give service. The instruments should be kept in repair and the lines also, and all necessary batteries furnished.

If this cannot be done, the exchange in the county should be owned and operated by local talent and capital. We would then establish a responsibility for good or bad service.

I would recommend rebuilding all county lines now in poor condition, and in rebuilding a line, spurs to each residence should be equally as good as the main line. One bad spur will kill the service of an entire line and also interfere with any connecting line through an exchange. By repairing all county lines, we would be able to tell how much of the grief existed in the local exchange.

I do not feel like criticising the operators in the exchanges unjustly when a great deal of the grief is caused by rusty lines and bad connection and perhaps faulty instruments which have seen too much service.

We have a right to expect and demand better service; we should do this by co-operation of effort along friendly lines if possible. I do not believe in encouraging radicalism from any standpoint. And permit me to wander slightly from my subject for a moment, I wish

to state that the farmers and producers of this county are facing the greatest trials perhaps in history, but we will come through it all in gallant shape with flying colors. For every disappointment we shall gain a double victory.

The present condition will establish the farmers to an inherited right which has so long been withheld. The farmer of today is a business man along with other interests, and not, as the cartoonist would have you think, a man with trousers in his boots and billy goat whiskers.

In co-operation we shall gain our proper social and business standing and keep the boys and girls on the farm, thus making this a better world in which to live.

Very respectfully submitted,
ALLEN THOMPSON.
Chairman, Telephone Project."

The most difficult thing a company's operating department has to contend with is the switched line service. While the lines and equipment are not the property of the telephone company, they by switching them, seem to have to assume all the burden for the character of the service.

One telephone company has adopted this policy in a number of its exchanges where switched line service is handled: When the owner of a line fails to keep it in proper repair so as to give reasonable service, the company disconnects the line from its switchboard and keeps it disconnected until the line is put in proper shape. This method has accomplished results and can be used to advantage at times.

The farmer is the worst fellow this company has to contend with in rate increases. He fights it tooth and toe-nail. Hence this report to the county farm bureau is a new and interesting experience for the telephone company operating in that county.

An appeal to the women of Indiana to inform themselves of the facts with regard to the public utility business is being made by Charles L. Henry, president of the Indiana Public Utility Association, which is composed of representatives of telephone, water, heat, light and other public utility companies in the state.

Mr. Henry has sent a letter to the secretary of all the women's clubs that are members of the Indiana Federation of Women's Clubs. In this letter he calls attention to the fact that women are really the patrons of the telephone, gas, electric and water companies. They determine the amount of service used in the household and in many cases pay the bills.

His appeal asks for a better understanding of the fundamentals of the utility business and the methods by which it is controlled by the public. On behalf of the association he offers the women's clubs a series of historical pamphlets that tell the history of the utility business in all its branches.

"In the opinion of our association," says Mr. Henry, "one of the most encouraging signs in the business world is the increasing interest shown by women in the affairs of business and government. We believe that interest promises well for the future."

The operators of the Mississippi Valley Telephone Co., Carthage, Ill., had a jolly time at their annual picnic held July 12 at Wild Cat Springs, Hamilton, Ill. General Manager O. F. Berry was there—he is seen on the extreme left of the photograph—as were other officers of the company. They evidently enjoyed the outing just as much as did the girls.

The Operators of the Mississippi Valley Telephone Co., Carthage, Ill., Enjoyed Their Picnic.

L. S. Hubbell, manager, Ohio State Telephone Co., Ravenna, Ohio, recently received a letter which shows that business men appreciate good service, and vice versa that good service builds up more business. The letter, from L. A. Babcock, manager of sales of The Byers Machine Co., is as follows:

"You perhaps would be pleased to learn of the truly wonderful service being rendered lately by your long distance forces.

Last evening on a call to Chicago we had our connection in less than two minutes—and this morning on one to Philadelphia, we were talking to our office there in less than five minutes after placing the call.

This company is a great believer in the value of long distance telephoning, especially as regards sales matters, and your records will show an ever-increasing business with us, due chiefly to the efficient co-operation of your long distance department."

How slips of cardboard, ingeniously inserted in telephone pay station instruments have cost the Northwestern Bell Telephone Co. in Minneapolis, Minn., losses estimated at several hundred dollars, was told recently following questioning of John Oakvik, 3021 Third St. N., by the police.

The police said that Oakvik, aged 27, who has been employed as repairman by the telephone company, made a complete confession to a series of thefts.

A sudden drop in the receipts at several pay stations in downtown stores, office buildings and hotels brought about the investigation which resulted in the discovery of the cardboard swindle, according to company officials.

For some time, they said, investigation failed to disclose the source of the drain upon the nickles and dimes slipped into the various telephones. Then one day an investigator decided to open one of the instruments. Inside he found the solution of the mystery.

The telephones are equipped with two locks, one of which opens a compartment containing the money and this key is in the hands of a collector. The second key, held by repairmen, opens another compartment through which the nickels and dimes pass on their way to the money container. By placing a piece of cardboard in this compartment Oakvik stopped the coins before they reached their proper destination.

In the Oregon Repeater a unique method of clearing a cross in a line, the two wires of which have been securely bound together by a tail from the kite of a small boy who failed to watch his step, is related.

The cross was in the center of the span, but fortunately, enough of the tail hung down to enable the resourceful troublemen to reach its end with a long stick. On the end of the stick they affixed a piece of paper and ignited it. In turn, the kite tail was set on fire and burned its way upward until just before reaching the second wire it parted and cleared the cross.

Growth of a Live Illinois Company

From its Inception in 1897 to the Present Time the Hume Telephone Co. has had a Steady Growth—An Aggressive Business Policy and Careful Management Have Been Big Factors in Making it "What It Is Today"

Way back in '97, George W. Hughes, a merchant banker, financed and constructed a telephone system in Hume, Ill. As we say, nowadays, he "started something." The country roads were soon lined with poles and wires. The demand for long distance service soon brought about the construction of a toll line and the system connected with a neighboring exchange which at that time was a sublicensee of the Central Union (Bell) telephone company.

The Company's Success Is Due Largely to Careful Financial Management by G. W. Hughes, Its Sole Proprietor.

This toll connection was maintained until 1904, when the Bell company ordered Mr. Hughes to either discard his Independent equipment or lease other equipment from it, or it would sever his long distance connection. Upon his refusal to discontinue the use of the Independent equipment, the toll line was disconnected and further long distance service was refused.

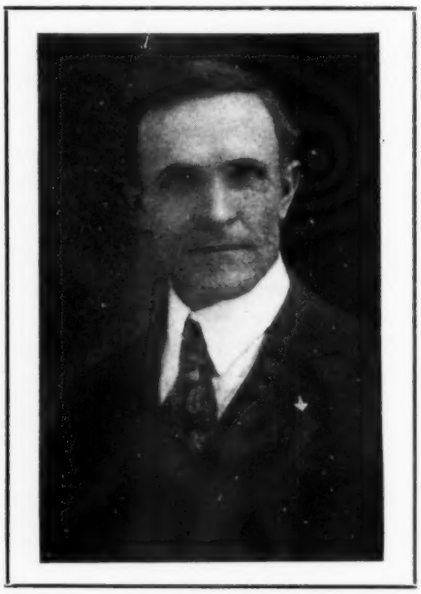
As this policy of the Bell company was universal at that time, the Independents became alarmed, fearing that many members might succumb to the pressure of the Bell company. A meeting was accordingly called of all the Independent companies in that section of the state in order that the situation might be discussed.

The result of this meeting was the formation of a league of Independent companies which signed an agreement that any company in the league which deserted the Independent cause should pay $5,000 to each member of the league.

This severe penalty held the Independents together and enabled them to withstand the encroachment of the Bell company, whose action served to stimulate the Hume company until it expanded in every direction. Toll lines were constructed to Paris, Brockton, Chrisman, Sidell, Metcalf, Allerton and Newman and a telephone system and central office constructed in Brockton with rural lines radiating throughout the district.

Today, on the second floor of the sturdy and commodious brick building shown in the accompanying illustration, is the central office of the Hume Telephone Co. which now operates 1,000 telephones and has recently installed the new two-position Stromberg-Carlson No. 105 high efficiency switchboard as shown in one of the other illustrations.

It owes much of its success to the careful financial management of George W. Hughes, its sole proprietor, and Joseph Benefiel, who has been its local manager for 20 years. Miss Vera Casebeer is the efficient secretary of the company.



Working 24 Years With Only Seven Days' Absence Is the Record of Local Manager Joe Benefiel.

Mr. Benefiel was born in Hume in 1879. His earlier education was received in the Hume public schools. Five years before entering the telephone business, Mr. Benefiel was a printer on the Hume Record. In 1902 he quit the Record and started work as a night operator. Three months later he began line and trouble work, and in 1912 was made manager of the Hume company, which position he now holds.

Manager Joe's great characteristic is dependability. He'll do exactly what he undertakes and then some.

"I have worked 24 years," says Mr. Benefiel, "and lost only seven days' pay." It is not necessary to add that this is a remarkable record. Such constant service cannot but be a big factor in the success which the Hume Telephone Co. has attained.

The outside construction of the Hume company consists of metallic city and rural lines; no grounded lines. In part, the construction is cable and open wire. The company also operates about 150 miles of toll lines. No free exchange is given to neighboring towns.

The Hume Operators at the Company's New No. 105 Stromberg-Carlson Efficiency Switchboard.

INDIANA TELEPHONE INTERESTS CO-OPERATE.

(*Continued from page* 14.)

This new relation between the Bell and its connecting companies in Indiana has been and is highly beneficial to the public as well as to both systems. It has given the public universal service, relieved it of the expense of having to pay for the maintenance and operation of two telephones and abolished the nuisance of a divided service for many communities.

The two systems have benefited financially, as earnings which were formerly wasted in warfare are now used for keeping up plant and improving operating conditions. Rates for service have been increased and companies that formerly were on the verge of destruction have been able to rehabilitate themselves and lay the foundation for a successful career.

The Bell company is benefited by the addition of millions of connecting company stations that not only are feeders for its toll lines but also stimulate growth in its own exchange areas. It is also relieved of the necessity of being dragged into furnishing service in rural communities and small towns, where under present conditions it is impossible for any foreign corporation to even earn operating expenses out of the telephone business.

The new arrangements, however, are greatly beneficial to the connecting companies. These companies have their respective fields of operation to themselves and no longer stand in danger of having their business ruined by ruthless competition.

When the Bell enters into a traffic agreement with a connecting company, it not only agrees to stay out of the exchange business itself in that company's territory, but it will not connect with another Independent company that might seek to or does enter the territory of the existing connecting company. As no public telephone company can survive without toll line connection, these connecting companies are practically immune from competition.

From the beginning the Bell company has had to solve for itself the many and ever-increasing problems arising in its engineering, auditing, commercial, traffic and legal departments as there was no one else before it to whom it could go for advice or help. This it has done at an immense expense to itself.

But all of this research, development and experimental work, is in a measure available for the connecting companies without one penny of cost. The general offices of the Bell telephone company are always ready to give information or extend help, when needed, to connecting companies, when it is possible to do so, and many companies avail themselves of this help.

This connecting company arrangement has a tendency to stabilize the investment of connecting companies in that it removes from them the menace of competition and a divided business. Their success or failure is now due to their own internal management which they can control, and not to external forces attempting to crush them, over which they have no control. In addition to this, they are an integral part of the greater telephone operating system and essential to it.

Their destiny in a measure is dependent upon the destiny of the greater system. They rise or fall with it. They succeed or fail as it succeeds or fails. But the telephone business as a whole is so essential to the business and life of the nation, that it cannot fail until the nation fails. The telephone environment and the business of the individual companies has become fixed. Instead of uncertainty and an unknown future, there is certainty and a known future.

The business is stable. Well-managed companies are winning from the investing public confidence in their business. Capital is no longer being invested in them because of speculative possibilities, but because of their worth as a stable investment, thus insuring to well-managed Independent telephone companies all the money necessary to carry on their business.

The Home of the Hume Company Is on the Second Floor of the Hughes State Bank Bldg.

The stronger a connecting company is in its territory of operation, the stronger is the Bell system, hence it is to the interest of the Bell to extend to its connecting companies all the help and assistance possible. This is purely a business and not a philanthropic proposition. This is the reason why the Indiana Bell Telephone Co. became a member of the Indiana Independent Telephone Association when the doors were thrown open to it two years ago, and the Independents changed the name to the Indiana Telephone Association.

Co-operation among all telephone companies in Indiana is the order of the day, and to properly co-operate and help each other they must combine their efforts in the matter of better acquaintance, legislation, rate adjustments and equitable taxes.

The Bell and larger Independent companies are equipped to fight their own battles, but many of the smaller companies needed help along these lines. The older state association did not have the means to hire trained men to assist such companies and protect their interest in legislative matters before the public service commission and state tax board. So the Indiana Bell, although it has only one representative on a board of 15 directors of the state association, and although it was recognized at the time that it would have to pay into the association an annual assessment one-half more than the total assessments of all the Independent member companies combined, gladly became a member.

The basis of assessment at present against member companies of the association is two cents per unit per annum, each telephone instrument and each circuit mile of toll line wire operated being considered a unit. The Bell pays into the association on the basis of 180,000 units, while all the Independent member companies pay on the basis of 120,000 units.

This gives the association sufficient funds to have a paid secretary, a retained attorney, and a paid treasurer and manager, who devotes all of his time to the work of the association. The beneficial result of such an arrangement is shown, not only in legislative matters, but in friendly personal contact at district and state meetings.

The association has been helpful in a concrete way to many companies before the public service commission and the state tax board. Without charge, it has during the past year helped more than 150 companies in rate cases, 50 of which were prepared and conducted by the as-

sociation. It also has represented more than 75 companies before the tax board, 50 of which received reduction in their tax assessment.

That the state telephone association is a powerful organization for the good of the business is evidenced by the fact that a member of the public service commission stated at a public hearing that when the association, as such, requested a thing to be done it was difficult for the commission to refuse the request. The state association is powerful because the Bell and Independents have joined hands to make it powerful. They are fighting side by side for better telephone conditions in the state, knowing full well that whatever is to the interest of one is to the interest of all.

The traffic agreement between the Bell and connecting companies gives to each the fullest and greatest possible use of each other's toll lines and exchange systems. Local toll lines, which it would not pay either company to build and maintain for purely local traffic, become paying investments when linked together into a system, for in addition to local tolls these lines share in the pro-rata earnings of through toll messages which gives them additional earning powers. This not only benefits the companies themselves, but gives the public a much wider range of toll line service.

The leased wire arrangement, wherein the Bell leases pin space and conduits from the connecting companies, and the connecting companies lease like facilities from the Bell, saves duplication of pole line and underground construction. This reduction of construction and doing away with the maintenance of duplicate plant saves the telephone users thousands of dollars annually.

When the warfare between the Bell and Independent companies in the state was being waged, many impractical policies and bad conditions were established and perpetuated. In addition to duplication, cut rates, and too low a rate, free service was given between exchanges and companies sometimes widely separated. Long-time service agreements, which in many cases were wholly inequitable, were entered into.

With an utter disregard as to the future of the business, with little thought as to after effect, with all energy bent on getting an immediate advantage, practices were established which for a while made it look impossible to ever bring these warring factions together or bring order out of the chaotic condition.

But the impossible has been accomplished. With but a few exceptions, the tangled skein has been untangled and the jumbled condition has been transformed into orderly procedure. Uniform traffic agreements today bind the Indiana Bell toll line system with its 90 exchanges and 175,000 subscribers and the toll line systems of 550 Independent companies, with 700 exchanges and 275,000 subscribers, into one vast operating system. Co-operation and a fixed determination to make the telephone business what it should be is the policy of both the Bell and the Independent systems.

While there are many problems yet to be solved, and many difficulties to be overcome, a solid foundation has been laid and the future of the telephone business in Indiana is an assured success. To one who knew the perplexing condition of the telephone business in Indiana 15 years ago, the present unified, universal, smoothly working system is a picture beautiful to behold.

THE ULTIMATE REWARD

By Miss Anne Barnes.

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa.

I have in mind two girls who started on the same road and who finally reaped entirely different rewards. These girls came from families whose worldly possessions were on the same level.

Both Kate and Mary started to work in the Crystal City telephone exchange as soon as they had finished high school. They started in at the usual wage of about $50 per month. The trouble of learning the work, the unusualness of the beginner's early and late hours, the confining nature of the work itself, all of these things soon began to pall upon the girls.

Kate became tired of the routine and tried to persuade Mary to quit and go to work in one of the factories. Mary, seeing something better after all the drudgery, persuaded Kate to stay on at the office. One day Kate, full of enthusiasm, approached Mary and said:

"Well, Mary, I am going to quit, and you're going to quit with me."

"No, we're not, Kate," replied Mary.

"Yes, we are," answered Kate; "and we're going to work at McHenry's department store at sixty per."

"I am going to stay here, Kate, even if I do make only fifty dollars a month now."

"Now!

"Yes, now and forever!

"I'm tired of this low pay and hard hours. I want some evenings off. I want to be where I can see my friends and talk to them. Here we are, lashed to the board all the time. It's no good!"

"I'm very sorry if you feel that way. I wouldn't leave, though. Don't you see, Kate, that you will be lashed to the counter at McHenry's? Besides, promotion will be just as rapid here as there."

"Well, I resigned this morning, Mary. Good-bye!"

Kate left, but Mary stayed. Five years have passed. Mary, through her fidelity to her work has become a chief operator, at $90 a month. She is one of the best liked chiefs that I have ever known.

Kate has not prospered so well. Six months ago she was still a saleslady at McHenry's. Then McHenry's burned to the ground and the company decided not to rebuild. Kate was forced to get work elsewhere. None of the other stores needed girls, so she came back to the telephone office at five dollars more than she had received five years before.

Compare these two girls. Mary has a chance for a successful future, transfer to a larger office and higher wages. Kate has nothing but five years of standstill at McHenry's. Kate had received the highest saleswoman wage for the past two years.

The ability to visualize the ultimate reward is the quality which one girl possessed and the other girl did not. It is a quality which everyone should cultivate. The power to see the final profit leads us to prosperity, not to mere wealth.

Novel Feat of Tuning a Piano Over the Telephone.

The novel feat of tuning a piano by use of the telephone was accomplished recently by a Wabash, Ind., piano tuner, who sold a piano to a party in South Bend.

He was advised over the telephone one day by the customer that the piano needed a tuning, and proceeded to tune it by telephone. The customer was asked to sound the instrument, which was near the telephone. The tone was transmitted clearly and directions given which enabled the customer to change the tension. The instrument was sounded until it was perfectly tuned.

Commissions, Courts and Councils

Discussion and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchise, Rates and Service

Commission's Experiences in Standard Accounting.

Considerable progress is reported by the Nebraska State Railway Commission in its determination to require all of the companies reporting to it to adopt a standard form of bookkeeping. The larger companies readily adopted the system of books prepared and printed for the commission, but considerable difficulty has been experienced in getting the smaller companies, particularly those where farmers are largely interested, to follow instructions.

The average farmer takes the position that he is honest himself and can be fully trusted to do the right thing, but that nobody else is. One company, owned entirely by farmers and controlling considerable territory, absolutely refused to put in the system, although the commission accountant showed the value to it in a bookkeeping way. This company controls, in a loose sort of organization, 12 small companies, and was of the opinion that it would have to buy 12 sets of books.

In the directors' meeting, the opinion was freely expressed that it was a graft for the benefit of a printing establishment, as only one source of supply is available. The secretary of the company has been assured by the company that the printers' prices have been as strictly regulated as have been the charges of the telephone company; that before the contract was awarded to the company, bids were asked for from a number of printers, but as soon as these found that they would have to act as a supply depot and would not get paid for the job when it was all printed up, all withdrew but one.

The commission supervised the work and fixed the charges for each book and record, and the printer stocked up with about $8,000 worth of the supplies on hand.

One telephone company refused to put the system into effect because it was losing money and did not want to add bookkeeping costs, but when the commission went into court with an application for a mandamus, it capitulated. Since then the commission has had but little trouble.

Commission Approves Merger of Bell With Independents.

Telephone competition at Jacksonville, Literberry, Alexander, Carrollton, Roodhouse and White Hall, was abolished by an order entered by the Illinois Commerce Commission, July 28, authorizing the Illinois Telephone Co. to purchase the exchanges of the Illinois Bell Telephone Co.

The deal for the consolidation of the companies was completed some time ago, and the state commission has now sanctioned it.

Denies Rehearing of Fort Wayne, Ind. Telephone Rate Case.

In an order issued August 19, the Indiana Public Service Commission refused to reconsider its recent decision denying an increase in telephone rates at Fort Wayne. The rehearing asked by the Home Telephone & Telegraph Co., which also operates the plant at New Haven, was opposed by City Attorney Williams. The company has one week in which to appeal the case.

In denying the rehearing, the commission, however, modified its order to include $31,100 more in the valuation of the company's property, giving the total valuation at $1,540,981. This increase, the commission said, would reduce the company's possible rate of return on the investment to 7.58.

The company's petition, which was filed with the commission in March, asked for an increase in the business telephone rate from $3.50 to $6 a month, in the residence rate from $2 to $2.75, and in the party line rate from $1.50 to $1.75. A hearing on the petition was held on May 23, and on June 29 a ruling was handed down denying the petition. A petition for a rehearing was filed on July 21 and the company's oral argument was presented before the commission on August 10.

Officers of the company have pointed out that the greater part of the proposed increase fell upon the business telephone and that 60 per cent of the subscribers would have been affected only slightly. They also declare that the company is operating today under the same rates as 25 years ago, with the exception of an increase of 50 cents in the business rate, which was granted by the commission in April, 1920.

In petitioning for the increase, the company asserted that its net revenues in 1920 yielded only a 2.6 per cent return upon the investment. It also declared that a loss of 3 per cent was anticipated during the current year.

In handing down its decision the commission stated that, in its opinion, the company had estimated its maintenance expenses about $30,000 too high, that $5,400 more had been included for salaries than should properly have been included, and that federal taxes should not be borne by the rate payer and paid out of the company's operating expenses, but should be borne by the stockholders.

Telephone Service in Horton, Kan., Is Resumed After Strike.

A strike at the Horton, Kan., telephone office, was settled temporarily when Randall Harvey, representing the Kansas Industrial Court, brought about an agreement to arbitrate the differences between the operators and officers of the company.

A board of arbitration will hear the complaints of the girls employed by the Northeast Kansas Telephone Co. which owns the Horton plant. Certain questions which caused difficulty are to be left to a board composed of the operators, officials of the company, and citizens of Horton. The company agreed to return the employes at the old status before the strike pending final settlement. Meanwhile service is continued in Horton.

Trouble is said to have been going on at the Horton exchange for some time over an attempt by the company to reestablish a pre-war custom of having a chief operator do some of the clerical work which had been done during the war by an extra bookkeeper. An official of the union recently arrived in Horton and called the strike to enforce a rule of the organization that no operators be made to handle office work in connection with their duties as operators.

Citizens Company of Grand Rapids, Mich. to Raise Rates.

The Citizens Telephone Co. of Grand Rapids, Mich., was authorized, in an order issued by the state public utilities commission on August 22, to equalize its rates in its territory with those of the Michigan State Telephone Co.

In some territory the order permits the company to make an increase as high as 12 per cent, while in others the order will have little or no effect on existing schedules. The petition of the company has been pending since September 1, 1920, and a number of hearings have been held. The company wanted a flat increase in all its territory. Much of western and northern Michigan is served by the Grand Rapids company.

In issuing the order, the commission attached a statement, which read:

"The commission cannot develop ope-

rators, and cannot instill energy into indolent or shiftless managers. It must take conditions as they are and protect the public from imposition."

The new schedule, briefly, authorizes the following rates, effective October 1:

Group 1—Ada, Alto, Baldwin, Kingsley, Maple City, Old Mission, Port Oneida, Sand Lake, Tustin, Leland, Byron Center, Clarksville, White Cloud and other towns: Business telephone, per month, $2.20; residence, $1.55; formerly $2 and $1.50.

Group 2—Bellevue, Caledonia, Cedar Springs, Evart, Fremont, Lowell, McBain, Mason, Middleville, Nashville, Newaygo, Reed City, Saranac, Zeeland, and other towns: Business, $2.30; residence, $1.75; formerly $2 and $1.50.

Group 3—(a) Belding, Portland: Business, $3.50; residence, $2.30; formerly $3 and $2; (b) Allegan, Greenville: Business, $3.50; residence, $2; formerly $3 and $2.

Group 4—(a) Hastings and Holland: Business, $3; residence, $2; formerly the same; (b) Traverse City: Business, $3; residence, $2; no change; (c) Ionia: Business, $2.85; residence, $1.65; formerly $2.50 and $1.50.

Group 5—Lansing: Business, $4.90; residence, $2.90; formerly $4.50 and $2.50.

Kansas City (Mo.) Telephone Co. Given Rate Extension.

On July 23 the Missouri Public Service Commission ordered that the schedule of rates of the Kansas City Telephone Co., of Kansas City, on file with the commission, authorized June 26, 1920, and charged by the company, be extended for a further period of 13 months effective August 1.

The company was ordered to keep a full account of its revenues and expenses at its Kansas City exchange and to file a full report with the commission at the end of a 12 months' period from August 1.

Nebraska Commission Applies For Rehearing on Farm Mutual Case.

Great reluctance is shown by the Nebraska State Railway Commission in accepting the decision of the state supreme court that it has no control over farm mutuals that are connected with telephone systems and accept messages originating elsewhere than on their wires. It has applied for a rehearing and filed a brief in support of the motion.

The case was originally an action by the state against the Southern Elkhorn Telephone Co., unincorporated, to enjoin it from refusing service to Fred Doxstader, a farmer living near its line, and to require it to obey an order of the commission to furnish that service. The company replied that it was not organized to render service to the public, and that it is not a common carrier in that it does not operate for hire.

The court sustained this contention of the defense, and held that the connection with the outside world was merely incidental and that the purpose for which it was organized, and not that for which it was occasionally used, governed its character.

Originally eight men asked the Nebraska Telephone Co. to give them service. It declined to deal with individuals, and a company was organized that built the line and then contracted with the Bell for city switching. The commission attorney claims that switching service is merely an interchange of service, which means actual use of the property of each by the other, and as the evidence shows there was a contract for payment by the farmers' company, it thereby became a carrier for hire.

The service sought before the organization of the company was common-carrier service from the Nebraska company, and if it had built the lines or leased them, there could be no question of the obligation to furnish Doxstader service. The defendant company built the lines and occupied part of the highway and its members get all the service they would have had if the Bell had built the lines, and it is contended they cannot discriminate against any person desiring service.

The obligation of the company was the deliberate act of its membership, it is claimed. They bound themselves to keep their lines in order and by virtue of that contract, which also provides the use of their lines for long distance messages for hire, they bound themselves to the public. They enjoy the difference between its charges and those that would be made by the Nebraska company as pay for the use of its lines, and thus uses its lines in connection with those of the Bell for hire.

The statute does not require that the hire be paid in cash to the owner of the line. It is sufficient if the line is used for hire. Under the contract, when a long distance call from Omaha to a member of the defendant company is charged for, a part of that charge or hire is for the line extending from the corporate limits of Norfolk to the subscriber's telephone. If the use of its lines is charged for at all, as in this case, the company is operating for hire.

The commission informs the court that "the case is important because involving principles of wide application and of far-reaching effect. Scores of matters now before the commission are dependent upon the results hereof."

Another Step Taken in Ohio Telephone Merger.

Another step towards the consummation of the proposed consolidation of the Ohio Bell & Ohio State Telephone Cos. in Ohio was taken on August 11 when the board of directors of the Bell company, at a meeting in Cleveland, approved the agreement covering the consolidation, it was announced recently.

The agreement was approved by the Ohio State company's directors at a meeting in Columbus August 9, the approval by the directors of the two companies being subject to further approval of the stockholders and the necessary public authorities.

Notice has been issued of a special meeting of the stockholders of the Ohio State company at Columbus, the latter part of this month to consider and act upon the proposed agreement. A similar meeting of the stockholders of the Bell company will be held in Cleveland.

Upon approval of the agreement by the stockholders of both companies, application must be made to the public utilities commission for authority to proceed with the consolidation.

Writ of Error Granted by Court in Telephone Case.

The supreme court of Missouri in banc August 4 granted a writ of error to attorneys for the Southwestern Bell Telephone Co. to permit an appeal from a decision of the supreme court in a case in which the telephone company seeks to enjoin the Missouri Public Service Commission in the matter of rates, valuation and service charges.

The commission was upheld by the state court in its right to reduce the war-time rate schedule, fix a valuation based upon judicious investment, and to allow or abolish service charges. About $314,000 of disputed charges collected from patrons of the telephone company, which is on deposit in the Central Missouri Trust Co. in Jefferson City probably will remain impounded pending final adjudication of the case.

Seeks to Enjoin Tennessee Commission in Rate Case.

The Cumberland Telephone & Telegraph Co. on August 10 filed a bill in the U. S. District Court to enjoin the Tennessee Public Utilities Commission from requiring it to continue in effect its present telephone rates in Tennessee, which it alleges to be confiscatory, and to prevent the commission from interfering with its putting in effect the schedule of rates filed with the commission on May 31.

The suit follows the recent hearing before the utilities commission which resulted in the commission ordering an appraisal of the company's property preliminary to passing on the proposed rate increase. A large number of Tennessee cities and towns resisted the increase before the commission.

Oklahoma Commission Gives Increase to Broken Arrow.

On July 30 the Oklahoma Corporation Commission granted the petition of the Broken Arrow Telephone Co., operating an exchange at Broken Arrow, to in-

crease its annual rates for service, the new rates becoming effective August 1, as follows:

Business, one-party	$36
Business, two-party	30
Oil lease line service	48
Residence, one-party	21
Residence, two-party	18
Business extensions	12
Residence extensions	9
Residence owned stations	18
Switching service, per station	6

The commission held that the revenue which would be derived under this schedule of rates will not yield an income greater than is necessary to defray operating expenses and pay a small rate of return on the investment in plant, devoted to rendering the public service.

Contractors Restrained from Injuring Company's Wires.

On the application of the Dakota Central Telephone Co., an injunction was granted August 4, by Judge R. B. Tripp, restraining the Shipman Construction Co. from interfering with the lines of the telephone company in Hutchinson county, South Dakota.

The construction company was felling trees along a road in the course of construction between Parkston and Ethan, and according to the complaint, little regard was given the telephone lines.

A final hearing of any action for damages growing out of this case is to be held at Olivet in October.

Bell and Independent Merge at Hillsboro, Texas.

Telephone patrons at Hillsboro, Texas, have been notified that the Southwestern Bell Telephone Co. and the Hillsboro Telephone Co. exchanges have been merged under the head of the Texas Telephone Co. Headquarters will be located in the old Southwestern exchange building.

This terminates the fight for the consolidation of the two exchanges that has been carried on for years.

Telephone Company Refuses to Pay Expenses of Audit.

The Cumberland Telephone & Telegraph Co. has refused to submit to the order of the Tennessee Railroad & Public Utilities Commission in taxing the cost of the appraisal of telephone company's property and audit of its books to the company. The refusal was contained in a letter by the commission August 3, signed by Hunt Chipley, Thomas N. Greer and Keeble and Seay, attorneys for the company.

The letter acknowledges receipt of notice from the utilities commission to the effect that the commission had named Ross W. Harris to make such appraisal and audit, but sets out that the Cumberland company denies the right of the commission to make such an order. The letter also states that the books and records of the Cumberland company are at all times available to the authorized representative or representatives of the commission for inspection or audit, but emphatically declares that none of the expense of such audit or appraisal will be borne by the telephone company.

Wisconsin Commission Raises Rural Rates.

The Wausau Telephone Co. was authorized by the Wisconsin Railroad Commission on July 25, to increase its net monthly rates for rural magneto service to the following:

Rural line, magneto residence service	$2.25
Rural line, magneto business service	3.25

The toll charges from any of the rural subscribers to Wausau was ordered discontinued.

The company operates an automatic switchboard for its local business in Wausau and its rural subscribers' lines are brought into the toll switchboard of the Wisconsin Telephone Co. and connections between rural and local lines established by the Wisconsin Telephone Co. operators. For this service, the Wausau company has agreed to pay the Wisconsin Telephone Co. from June 1, 1921 a charge of $7.50 per rural telephone per year.

The company shows an investment in rural service at January 1, 1921, of $31,966.76, but this does not include any plant or equipment within the automatic service area embodying the city of Wausau and some adjoining territory.

Ordered to Construct and Maintain Clear Toll Line.

In an order entered August 16, the Wisconsin Railroad Commission rendered a decision in the case of the complaint of the Deerfield Telephone Co., against the Cambridge Telephone Co., ordering the Cambridge company to complete the installation of a clear toll line within 30 days from the point where the clear line of the Deerfield company is now connected to the line of the Cambridge company used for toll messages to the Cambridge exchange. It is also ordered that a clear toll line be maintained between the two exchanges.

The rate for toll messages between the two exchanges is to be 10 cents for each three minute call and each company is to pay to the other the sum of three cents for switching services on each message. The company originating the business is to retain the remainder of the toll charge in each instance, settlement to be made on or before the 15th of each month for business done during the previous month.

It appears that on or about April 30, 1918, the Deerfield company sold to the Cambridge company a portion of a toll line between the two exchanges, upon which toll line several local subscribers were served near the Cambridge end of the line, and that an agreement was entered into between the two exchanges that an additional circuit should be provided upon which local subscribers might be served and the toll line relieved of all local service.

This agreement provided that the Cambridge company was to install this additional circuit at its own expense.

The principal objection to the completion of this installation on the part of the Cambridge company has been that the state highway commission has had in contemplation a change and relocation of a portion of the highway along which its lines and circuits are to be constructed. An arrangement was made whereby the highway commission would designate at once what parts of the highway were to be relocated.

Rates Increased—Serves Several Segregated Groups.

The Wisconsin Railroad Commission on July 30 authorized the Eureka Telephone Co. to increase its annual rates for telephone service, effective August 1, 1921, as follows:

	Old Rate.	New Rates.
Business one-party	$27.00	$30.00
Business two-party	24.00	27.00
Business three and four-party	21.00	24.00
Residence one-party	21.00	24.00
Residence two-party	18.00	21.00
Residence, three and four-party	15.00	18.00
Rural residence	18.00	21.00
Rural business	21.00	24.00
Switching service	5.00	7.50
Answering telephones	5.00	6.50
Extension bells	2.50	3.00

The Eureka Telephone Co. renders telephone service to subscribers located in segregated groups in the villages of Neosho, Woodland, Iron Ridge, Rubicon and Hustisford and in the towns of Herman, Hubbard, Ashippun, and Lebanon.

As a result, an extensive system of lines must necessarily be maintained to connect these subscribers to the two exchanges located at Neosho and Hustisford serving 276 and 172 subscribers, respectively. The value of the company's property and plant used for the purpose of this proceeding was $34,613.80.

Wisconsin Rural Line Companies Given Increases.

On July 28, the Wisconsin Railroad Commission authorized the Spring Green Telephone Co., the West Spring Green Telephone Co. and the Big Hollow Tele-Co. to increase their rates for telephone

service. The new gross rates per quarter are:

Business one-party	$6.00
Business two-party	5.25
Business extension	1.80
Residence one-party	5.25
Residence two to four-party	4.50
Residence extension	1.50
Rural	4.50

The above rates are payable quarterly and subject to the usual 25 cents per month discount for prompt payment of bills.

The three companies together with the Spring Green & Wyoming Telephone Co. receive their central office service through a jointly-operated exchange located at Spring Green. The total number of subscribers receiving service from the Spring Green exchange is 313. Of this number, the Spring Green Telephone Co. serves 149, 115 of which are local and 34 rural. The Big Hollow company extends service to five local and 64 rural, and the West Spring Green company serves two local and 32 rural subscribers.

All lines of the companies are of grounded construction, with the exception of one line of the Spring Green Telephone Co. which serves three subscribers. The Spring Green Telephone Co. reports that the value of its property and plant is $4,000; the West Spring Green company, $494, and the Big Hollow company, $1,500, making a total investment of $5,994.

The new rates authorized became effective for service rendered on and after August 1, 1921, but jurisdiction is retained to revoke or amend this order if proper standards of service are not adhered to.

Telephone Rates Are Higher at Mellen Wis.

Authority was granted E. H. Bauch by the Wisconsin Railroad Commission on July 23 to increase rates at his telephone exchange at Mellen effective August 1 as follows:

	Old	New
Business one-party common battery	$2.25	$2.25
Business one-party magneto	2.00	2.00
Residence one-party common battery	1.50	1.75
Residence one-party magneto	1.25	1.50
Residence party line magneto	1.25	1.25
Business extension	1.00	1.00
Residence extension	.75	.75
Extension bell	.25	.25
Rural party line magneto	1.25	1.25

The exchange at Mellen was constructed in 1903 by the Ashland Home Telephone Co. which owned it until it was purchased at auction by Mr. Roehling, of Chicago, on June 16, 1919. Operation was continued under his management until December 2, 1919, when Mr. Bauch purchased it.

Since the plant would have to be entirely rebuilt before standard service could be rendered, it was proposed to reconstruct the system and install an automatic service in order to reduce operating expenses. The total estimated expense for automatic service at the Mellen exchange amounted to $5,295.64. The automatic system has now been installed at Mellen for more than six months.

Eastern Wisconsin Telephone Co., Raises P. B. X. Rates.

The Wisconsin Railroad Commission rendered a decision on August 16 authorizing the Eastern Wisconsin Telephone Co., to increase rates at its New Holstein exchange for private branch exchange service from its old rate of $12 per month for a system consisting of two trunks, 12 subscribers' telephone and one floor-type switchboard, to $2 per month each for trunk lines; $4 per month for private branch exchange board; and $1 per month each for subscribers' sets.

The new rates are effective on and after September 1.

Injury to Telephone Lineman from Electric Shock.

In a telephone lineman's action for injuries by electric shock against a generating company whose wires crossed those of the telephone company, the lineman's employer, plaintiff lineman is not to be conclusively deemed guilty of contributory negligence because he did not go to a neighboring house and call up the central office of the telephone company relative to trouble on the lines, instead of climbing a pole to make connection with his own instrument, or because he did not open a transmission box and connect there.

In a telephone lineman's action for injuries from electric shock against a generating company whose wire crossed the telephone company's and was brought into contact with it by the wind to plaintiff's injury, whether plaintiff was negligent because he took hold of or came in contact with the telephone wire held for the jury. Weddle vs. Tarkio Electric & Water Co.; Kansas City Court of Appeals, Missouri; 230 Southwestern, 386.

Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

August 16: The Nevada, California & Oregon Telegraph & Telephone Co., operating in Modoc county, granted permission to issue $6,200 of bonds to secure a note for $5,000.

FLORIDA.

August 22: Hearing at Tallahassee for an investigation of rates recently placed in effect by the Marianna Telephone Exchange and the Marianna Telephone & Telegraph Co.

INDIANA.

August 19: Application of Home Telephone & Telegraph Co., of Fort Wayne, for rehearing of commission's order refusing an increase in rates, denied.

MICHIGAN.

August 22: The Citizens Telephone Co. of Grand Rapids, authorized to equalize its rates in its territory with those of the Michigan State Telephone Co.

MISSOURI.

August 15: Certificate of convenience and necessity granted the Ellington Telephone Co. authorizing it to construct and operate a telephone exchange at Ellington.

NEBRASKA.

August 16: Application filed by the Kilgore Telephone Co. for permission to increase its rate schedule.

August 18: In the matter of application of the Monroe Independent Telephone Co. for permission to increase rates: application granted, order to follow.

NEW HAMPSHIRE.

August 12: New tariffs providing for certain increases in station-to-station toll rates upon calls to and from the several exchanges of the Kearsarge Telephone Co., of Salisbury, proposed as effective as of August 21, filed by the New England Telephone & Telegraph Co. and the Central New Hampshire Telephone Co.

NEW YORK.

August 24: Hearing at Albany on petition of the Thousand Island Telephone Co., Inc. for authority to issue its common capital stock, also for a certificate of convenience and necessity and as to construction.

August 24: Hearing at Batavia on complaint of Joseph Michaels against the Darien Telephone Co. as to the removal of a telephone.

August 25: Hearing at Rochester in the matter of complaint of the city of Rochester by H. H. Edgerton, its mayor, against the Rochester Telephone Corp., as to rates; petition filed by city for rehearing on order of July 28.

OREGON.

August 16: Hearing at Salem on citation order entered requiring the Postal Telegraph Co. and the Pacific Telephone & Telegraph Co. to show cause why both corporations should not use the same set of poles on the Columbia River Highway in the vicinity of Goble.

PENNSYLVANIA.

August 10: Applications of the Bell Telephone Co. of Pennsylvania, the Allegheny County Light Co., and the Duquesne Light Co. for the joint use of plant equipment on the country club grounds in the fourteenth ward, Pittsburgh, approved. Applications of the Pittsburgh & Allegheny Telephone Co. and the Chartiers Telephone Co. for acceptances of the act of July 23, 1919. Purchase by Peoples Telephone Co. of Butler, of the controlling rights of the Fanelton Independent and the Burton Telephone Cos. approved.

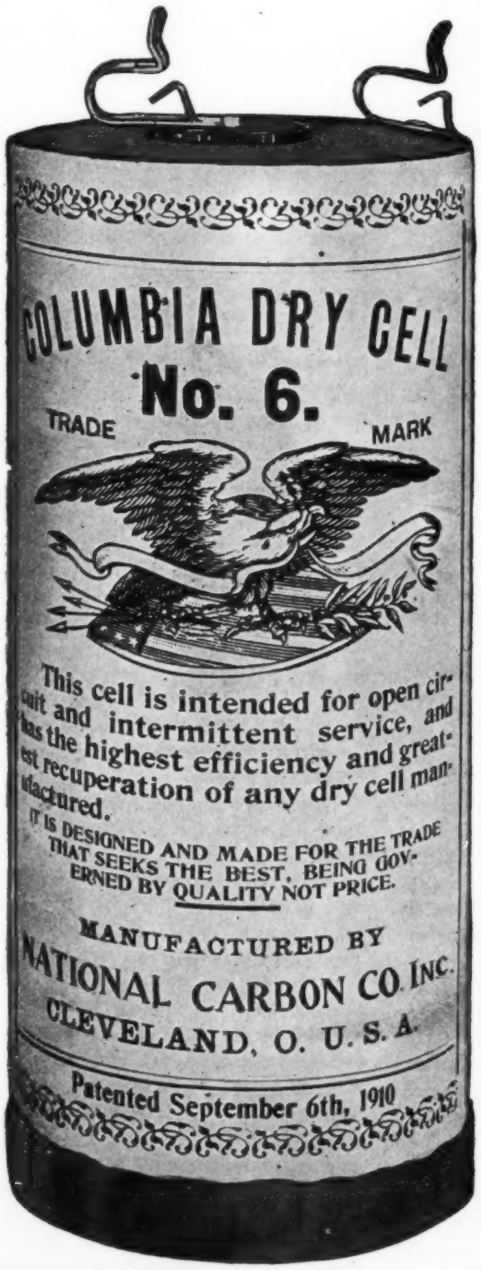
WISCONSIN.

August 16: The Eastern Wisconsin Telephone Co. granted permission to increase rates for private branch exchange service at its New Holstein exchange.

August 16: Decision rendered in the case of the complaint of the Deerfield Telephone Co. against the Cambridge Telephone Co. The Cambridge company ordered to complete the installation of a clear toll line within 30 days from the point where the clear line of the Deerfield company is now connected to its line.

Columbia Telephone Cell

"less cost per day of service"


COLUMBIA DRY CELL
No. 6.
TRADE MARK
This cell is intended for open circuit and intermittent service, and has the highest efficiency and greatest recuperation of any dry cell manufactured.
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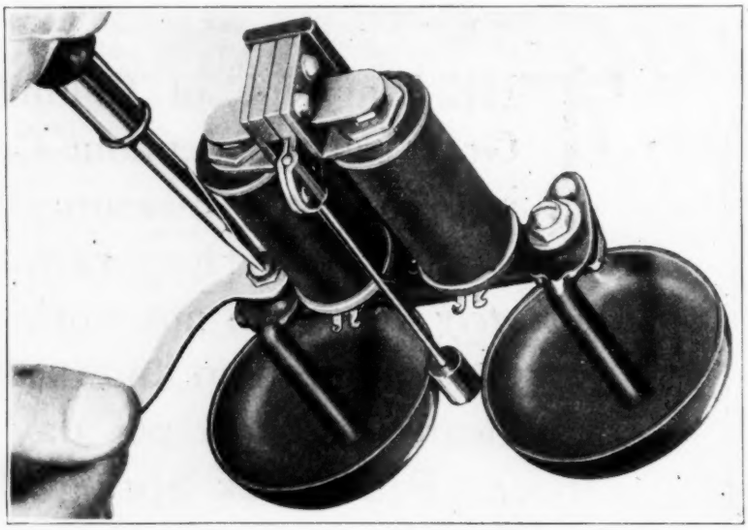
New Kellogg Harmonic Ringer Simplifies Adjustment.

A new harmonic ringer that is said to do away with adjustment trouble has recently been put on the market by the Kellogg Switchboard & Supply Co. Harmonic ringer adjustments have always given trouble but the troubleman can now think of ringer adjustment trouble as non-existent when this new ringer is used, states the company.

The adjustment features are contained entirely in the bell posts. The gongs are rigidly held "on center" and consequently, even when tampered with, will not throw the ringer out of order as is the case when eccentric type gongs are used. The length of a stroke and armature air gap remains unchanged during the life of the ringer.



The New Kellogg Harmonic Ringer Greatly Simplifies Adjustments.

The post adjustment is not the commonly used, slot-and-set-screw arrangement but is composed of an eccentric locknut and set screw. It is so arranged that even when the set screw becomes loose, the eccentric locknut continues to rigidly hold the bells in the correct position. To adjust the ringer is a simple operation. All that is required is a small S wrench, furnished with each ringer, and an ordinary screw drver. By unscrewing the set screw one-half turn and holding it in place with the screw driver, as in the illustration, the locknut may be easily turned with the wrench. A three-quarter turn to the right or left on each post gives a wide range of adjustment. However, rarely ever is more than a quarter-turn necessary.

With the use of a special heel plate, this ringer can be adapted to any make box. It has proven highly satisfactory not only because of its simple, permanent adjustment feature but because it is a signal that will satisfy every requirement. Its two and one-half inch gongs give a strong, clear tone that is easily heard at a distance.

Permanent harmonic ringer adjustments that formerly took a great deal of time and patience, and sometimes could not be accomplished at all, can now be made in a very few minutes. Built to the well-known Kellogg standard and combined with the new adjustment features, it is a ringer that is desirable in every respect.

Book Review.

AUTOMATIC TELEPHONE SYSTEMS: VOLUME 1, CIRCUITS AND APPARATUS AS USED IN THE PUBLIC SERVICES, by William Aitken. Published by Benn Bros., Ltd., London, England. 282 pages, 8 ins. by 10½ ins., with 211 illustrations. Price 25 shillings net, postage 1 shilling.

The special feature of this book is the clearness of the illustrations, an effort having been made to simplify the forms of the diagrams by rearranging them and eliminating unnecessary cross lines, dividing them into sections when necessary and continuing them section by section so as to show the relationship and interconnection of the system as a whole. The circuits are numbered from end to end with the same symbol so that each circuit may be easily traced.

The important circuits and arrangements of the principal standard or commercial systems are illustrated and described; representative examples are taken from each and some are dealt with in detail on one system and other features in more detail on other systems.

Instead of chapters the book is divided into short sections in order that matter contained therein may be replaced should it become necessary owing to changes which are constantly being made in automatic systems.

The present volume, after taking up the general characteristics of automatic systems, presents a detailed description of the Strowger system discussing separately the systems put out by the Automatic Electric Co. and Siemens Bros. & Co. The equipment, circuits and testing methods employed in these systems are all discussed fully. The rotary system of the Western Electric Co. is explained in detail, after which considerable information relative to the company's panel type system is presented, much of which is evidently taken from patent specifications.

The Lorimer system and that of the American Automatic Telephone Co. are briefly described.

Circuits and apparatus of the system of the Relay Automatic Telephone Co. are described in considerable detail. Three sections are devoted to a description of the apparatus, operation and circuits of the system produced by the Coventry Automatic Telephones, Ltd., and the North Electric Mfg. Co.

Volume II, which is in press, takes up, among other things, subscribers' equipment, semi-automatic systems, automatic switch design, and miscellaneous subjects connected with automatic equipment and operation.

The present volume forms a valuable contribution to the literature of the telephone art. It is of interest not only to practical automatic men in England but also in this country.

District Meeting at Bloomington, Ill. on September 7.

Wednesday, September 7, is the date selected by the Illinois Independent Telephone Association for holding a district meeting at Bloomington, Ill. Secretary-Treasurer Jay G. Mitchell requests that telephone companies send as many delegates as possible.

One of the features of the meeting will be a discussion of the new Illinois Commerce Commission law by an authority on the subject. Other interesting and valuable features will be provided, including an operators' school.

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Record of Telephone Patents

1,381,703. June 14, 1921; filed December 31, 1919. TELEPHONE SYSTEM; five claims; B. S. Cohen, Twickenham, England; assigned to The Relay Automatic Telephone Co., Ltd., Strand, England. The feature of this telephone set is a transformer having three windings, one in series with the transmitter, the second in series with the receiver, and the third connected to one end of a capacity. One of a pair of conductors is connected to the transmitter and receiver and provision is made for connecting the other conductor either to the transmitter and receiver or to the other end of the third winding of the transformer.

1,381,903. June 21, 1921; filed June 16, 1920. TELEPHONE DESK SET; seven claims; P. C. Burns, Chicago; assigned to American Electric Co. The features of this desk set is the placing of the induction coil within the base and the provision for the standard to be to one side of the center of the circular base.

1,382,012. June 21, 1921; filed May 14, 1919. LINE SWITCH SYSTEM; 14 claims; W. T. Powell, Rochester, N. Y.; assigned to Stromberg-Carlson Telephone Mfg. Co. In this automatic system, connector switches are provided having contacts in which the telephone lines terminate. The line switch is provided with fixed and movable contacts having no normal position, each of the telephone lines terminating in the movable contacts of the line switches. Provision is made for connecting any line through one of the connector switches and means are effective thereupon for moving the movable contact of the associated line switch out of engagement with a fixed contact.

1,382,262. June 21, 1921; filed July 16, 1919. SWITCHING SYSTEM AND INDICATING DEVICE THEREFOR; six claims; R. M. Allen, East Orange, N. J.; assigned to Western Electric Co. This switching system comprises a number of vibration detectors and observing stations and a binaural observation set thereat. Provision is made at the observing station for selectively associating pairs of detectors with the observation set.

1,382,265. June 21, 1921; filed November 24, 1919. TELEPHONE BOOTH; two claims; F. F. Beeby, Chicago; assigned to Cement Gun Construction Co.. Chicago. A sectional reinforced circular telephone booth is described.

1,382,273. June 21, 1921; filed May 4, 1916. COMBINED TRANSMITTER AND RECEIVER; W. W. Dean, Chicago; assigned to Stromberg-Carlson Telephone Mfg. Co. This telephone hand set consists of a relatively thin sheet metal shell for housing a telephone instrument and a handle member for the housing, the transmitter and receiver being at opposite ends of the handle.

1,382,631. June 28, 1921; filed May 17, 1919. REPEATER CIRCUITS; six claims; C. S. Demarest, Brooklyn, N. Y., and S. P. Shackleton, New York; assigned to American Telephone & Telegraph Co. In this signaling system, provision is made for connecting a repeater with a line by means of keys associated with switching apparatus.

1,382,745. June 28, 1921; filed February 16, 1917. ELECTRICAL RECTIFIER AND POLE CHANGER; six claims; F. Schoenwolf, Chicago; assigned to Kellogg Switchboard & Supply Co. The primary winding of a transformer is bridged across a source of alternating current, as is also a rectifier which is provided with a pair of magnets. A pair of secondary windings of the transformer is connectetd to contacts of the rectifier, while a condenser is placed in circuit with the rectifier magnets to neutralize their impedance to permit the armature of the rectifier to vibrate in synchronism with the alternating current.

1,382,766. June 28, 1921; filed June 20, 1917. PARTY LINE LOCKOUT FOR TELEPHONE SYSTEMS; 10 claims; J. W. Dorsey, Winnipeg, Manitoba, Canda. A potential relay at each substation is provided for normally holding the talking circuit open. It is responsive to the closing of the switch hook contacts to close the talking circuit and produce fluctuations therein for an appreciable time.

1,382,817. June 28, 1921; filed April 28, 1917. MEANS FOR AUTOMATICALLY RECORDING CALLS IN TELEPHONE SYSTEMS; nine claims; W. J. Blair, Melbourne, Australia; assigned to A. E. Woods, Melbourne. In this system an effectual call meter and an ineffectual call meter are provided, each having a relay in their circuits. A control relay having two armatures controls the circuits of the two relays, the armatures being so arranged that one requires a greater strength of current to operate it than the other. Means on the control relay are controlled by the armatures for completing one or the other of the relay circuits, according to whether the call is effectual or ineffectual.

1,382,891. June 28, 1921; filed February 6, 1917. TELPHONE SYSTEM; 12 claims; B. D. Campbell, Oakland, Calif. In this pay station the coin-controlled mechanism is operable entirely by the calling party for completing a connection, collecting the coin when the called party answers, and for returning the coin when the called party fails to answer.

1,383,038. June 28, 1921; filed June 10, 1919. TELEPHONE CALL WIRE CIRCUITS; one claim; J. F. Toomey, New York; assigned to American Telephone & Telegraph Co. In this system comprising a number of switchboard positions, a relay is common to all the positions and in series with the switching equipment at each position. Means are controlled by the switching means at each position for completing a circuit for the relay at that position and the common relay. Means under control of the position relay connect the order wire to the position while other apparatus controlled by the position relay and the common relay prevent the simultaneous operation of any of the other relays. Means controlled by the position relay and the common relay operate the signals only at the positions which are not connected with the called circuit.

1,383,355. July 5, 1921; filed August 21, 1920. SWITCH FOR TELEPHONE LINES; seven claims; C. W. Watkins, Dorranceton, Pa. A bar is pivotally connected intermediate its end with an insulating base to swing in either a vertical or horizontal plane. Pairs of contacts are carried by the base upon opposite sides of the pivot points and pairs of contacts, carried by the bar, are adapted to selectively engage the pairs of contacts on the base and a pair of conductors carried by the bar and connecting pairs of contacts carried thereby.

1,383,472. July 5, 1921; filed May 25, 1920. AUTOMATIC TELEPHONE PAY STATION; five claims; G. A. Long, Hartford, Conn.; assigned to the Gray Pay Station Telephone Co. Coin-operated means at the substation are provided for rendering the telephone operative and for rendering the calling dial operative to make a local call to other subscribers. Provision is made for effecting the action of signals of different characters by coins of different denominations.

1,383,584. July 5, 1921; filed December 27, 1918. TELEPHONE SYSTEM; six claims; R. S. Wilbur, Lyndhurst, N. J.; assigned to Western Electric Co. An input circuit is provided for a repeater bridged across a telephone transmission line. An electromagnetic ringing current responsive device is also bridged across the line and tuned to respond to currents of ringing frequency, while impedance included in the repeater bridge presents high impedance to currents of ringing frequency.

1,383,588. July 5, 1921; filed October 29, 1915. SEMI-AUTOMATIC TELEPHONE EXCHANGE SYSTEM; 31 claims; J. L. Wright, Cleveland, Ohio; assigned to Western Electric Co. In this semi-automatic system, means independent of a trunk switch are provided for selecting the connector switch, and for operating it when selected to render it unselectable. Means controlled by the trunk switch are operated to again render the connector switch selectable.

1,383,677. July 5, 1921; filed August 7, 1919. TELEPHONE EXCHANGE SYSTEM; four claims; G. Thompson, Mount Vernon, N. Y.; assigned to Western Electric Co. The feature of this automatic system is a differentially-wound stepping magnet for operating an automatic switch. Means are provided for energizing the windings of the magnet to prevent further operation thereof when the switch engages terminals at an idle line.

1,383,700. July 5, 1921; filed August 14, 1918. ACOUSTIC DEVICE; 10 claims; H. C. Egerton, Bridgewood, N. J.; assigned to Western Electric Co. This acoustic device comprises a sound-responsive body with a current-varying device operated therefrom. A radially inflexible coil spring connects the sound-responsive body and the current-varying device.

1,383,737. July 5, 1921; filed January 8, 1918. METHOD OF AND APPARATUS FOR RECORLING AND REPRODUCING SOUND; 17 claims; J. L. McQuarrie, Montclair, N. J.; assigned to Western Electric. This method of forming sound records consists in subjecting a sound-responsive recording mechanism to the sound vibrations to be recorded, and reducing the sensitiveness of the recording mechanism upon the occurrence of sound vibrations exceeding a predetermined amplitude.

1,383,743. July 5, 1921; filed August 24, 1918. TELEPHONE EXCHANGE SYSTEM; six claims; L. A. Mortimer, N. Y.; assigned to Western Electric Co. In this signaling system between a number of switchboards, signal control means at one of the boards is responsive to signaling current on the transmission line. Mechanism controlled by the signal controlled means impress a current on one of the talking conductors of the line intercon-

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necting the switchboards and means at the second switchboard responsive thereto operate a busy signal device.

1,383,750. July 5, 1921; filed June 26, 1918. ALTERNATING CURRENT SIGNALING SYSTEM; 21 claims; R. D. Parker and B. P. Hamilton, Brooklyn, N. Y.; assigned to American Telephone & Telegraph Co. In this signaling system a number of signaling channels is provided at the sending station, and provision made to successively associate the channels with the transmission circuit interconnecting with the receiving station. There are corresponding channels at the receiving station which are permanently associated with the transmission circuit. Means at the sending station transmit currents having different characteristics for each channel as successive channels are associated with the transmission circuit, and means at the receiving station responsive to the current select the corresponding receiving channels.

1,383,756. July 5, 1921; filed August 1, 1917. AUTOMATIC SWITCHING APPARATUS FOR TELEPHONE EXCHANGE SYSTEMS; six claims; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. In this automatic switch a stepping pawl moves a contact member in two distinctly separate movements in different directions to engage stationary contacts. Provision is made for holding the movable contact in advance position while a release magnet releases the holding means to restore the movable contact to its normal position.

1,383,789. July 5, 1921; filed August 24, 1919. TELEPHONE EXCHANGE SYSTEM; seven claims; R. D. Conway, Chatham, N. J.; assigned to Western Electric Co. In this trunking system between two central offices, switching means at the second central office are controlled over a control conductor and adapted to connect the trunk circuit between the two offices to a line circuit. Means responsive to the answer of a called station cause a predetermined variation of the resistance of the conductor, and a relay in the trunk circuit, which was operated upon the connection of the trunk with the line, is released upon the response of the called station. This relay controls a signaling device at the first central office.

1,383,802. July 5, 1921; filed May 14, 1917. SIGNALING DEVICE; five claims; C. L. Goodrum, N. Y.; assigned to Western Electric Co. The feature of this system is the provision for switching a source of ringing current on and off subscribers' lines periodically, a relay controlling the length of the period. A second relay, which is unresponsive to the initial but responsive to the additional demands on the signaling device, causes the instant switching on of the ringing current at each demand.

1,383,804. July 5, 1921; filed November 19, 1918. TELEPHONE EXCHANGE SYSTEM; six claims; J. A. Hall, Bayside, N. Y.; assigned to Western Electric Co. The feature of this automatic substation set is the provision for preventing the opening of the contacts for closing the line, should the switch hook be momentarily depressed.

1,383,805. July 5, 1921; filed November 19, 1919. PARTY LINE METERING SYSTEM FOR TELEPHONE EXCHANGES; four claims; J. A. Hall, Bayside, N. Y.; assigned to Western Electric Co. A circuit for the line relay at the central office includes both sides of the party line in series and is closed by the removal of the receiver at the calling station. A set of meter switching relays at the central office is jointly controlled by a manual switch at the calling station, which is independent of the receiver hook, and the line relay to connect the meter of the calling station to the metering circuit. Provision is made for closing the metering circuit.

1,383,807. July 5, 1921; filed September 21, 1915. POWER MODULATION FOR RADIO TRANSMISSION; 19 claims; R. A. Heising, East Orange, N. J.; assigned to Western Electric Co. Two constantly active thermionic impedances are connected in parallel in reversed direction between two points in the antenna, and provision is made for varying each impedance in accordance with signal.

1,384,101. July 12, 1921; filed July 31, 1919. SERVICE BRACKET FOR TELEPHONE RECEIVERS; four claims; S. C. Sladden, New York, N. Y. An arm is pivotally mounted so that the end holding the receiver may be moved to rest the receiver upon the receiver hook. Provision is made for adjusting at will the active position of the arm.

1,384,153. July 12, 1921; filed January 12, 1916. TELEPHONE CORD TAKE-UP DEVICE; three claims; D. J. Roos, Bridgeport, Conn.; assigned to The Locomobile Co., Bridgeport. One or more pulleys are mounted adjacent an end of the casing of the device. A pulley block engages the sides of the casings and is arranged to slide thereon. The telephone cord is trained over the pulleys and springs to space the block from the other pulley.

1,384,398. July 12, 1921; filed July 12, 1917. SIGNALING SYSTEM; 10 claims; L. A. Mortimer, New York; assigned to Western Electric Co. In this signaling system a relay is responsive to a single application of signaling current. This energization of the relay serves to actuate one of a number of signaling devices and to condition another of the devices for operation. A second energization of the relay by signaling currents acts to disconnect the first mentioned signaling device and to actuate the second.

1,384,437. July 12, 1921; filed November 2, 1920. BRACKET FOR SUSPENDING CABLES UNDER LIGHT; three claims; O. Edelmann, Oak Park, Ill.; assigned to Western Electric Co. This bracket for holding telephone switchboard cables comprises a pair of jaw members having grooves for engagement with the support. The jaw members are connected together and bind a pair of cable-holding members in position.

1,384,579. July 12, 1921; filed October 16, 1917. AUTOMATIC TRANSMISSION CONTROLLING MEANS; 20 claims; J. F. Toomey, New York, and C. S. Demarest, Brooklyn, N. Y.; assigned to American Telephone & Telegraph Co. A number of relays are provided for variably controlling the transmission efficiency of the circuit. The relays are selectively operated in accordance with the terminating line with which the circuit is associated.

1,384,734. July 19, 1921; filed September 24, 1919. ELECTRICAL TESTING SYSTEM AND APPARATUS; nine claims; E. A. Anderson, Abilene, Kans. In this testing system the talking set includes an induction coil, transmitter, receiver and battery. An exploring coil is provided with switching means for alternating, connecting, and disconnecting the receiver with the remainder of the talking set and the exploring coil.

1,384,980. July 19, 1921; filed November 11, 1912. TELEPHONE EXCHANGE SYSTEM; 39 claims; A. C. Stuart, Cleveland, Ohio; assigned to J. R. Garfield, trustee, Cleveland, Ohio. In this semi-automatic system, provision is made for establishing a connection from an operator's position to a wanted line by means of a selector and connector switch. A single test relay associated with the connector switch is operated in case the wanted line is busy. Intermittent means associated with the connector switch are then immediately connected to the contacts of the relay to cause the intermittent operation of a signal at the operator's position.

1,384,994. July 19, 1921; filed April 16, 1919. TELEPHONE REPEATER EQUIPMENT; seven claims; C. S. Demarest, New York; A. B. Clark, Brooklyn; G. Crisson, Hoboken, N. J.; assigned to American Telephone & Telegraph Co. In this system means are provided to bridge an operator's equipment of low impedance across one of the lines of the transmission circuit. An autotransformer is associated with the bridge for increasing the impedance of the equipment sufficiently to prevent appreciable unbalance of the line.

1,385,286. July 19, 1921; filed March 25, 1919. TELEPHONE; seven claims; J. S. Timmons, New York. This desk telephone has a hollow, substantially conical supporting structure with an inlet opening for its small end. The receiver is movably carried by the structure with its diaphragm normally in position immediately adjacent the inlet opening to the interior thereof.

1,385,347. July 19, 1921; filed February 4, 1918. AUTOMATIC TELEPHONE SYSTEM; 15 claims; J. Wicks, Chicago; assigned to Automatic Electric Co. A controlling circuit for a signal at one end of the trunk line in this system is superimposed upon one of the trunk conductors. A relay in this circuit is operated by an impulse of direct current sent over the circuit and in turn operates the signal.

1,385,862. July 26, 1921; filed May 25, 1921. TELEPHONE MOUTHPIECE; four claims; V. Conomos, Lairsville, Pa. This flexible mouthpiece has a holder provided with transmitter engaging means to which it is detachably secured.

1,385,777. July 26, 1921; filed May 20, 1919. GRID CIRCUITS FOR ELECTRON TUBES; nine claims; A. B. Clark, Brooklyn, N. Y.; assigned to American Telephone & Telegraph Co. A source of potential is provided having terminals of graded negative potential with respect to the filaments of several electron tubes. Circuits connect respective input translating devices for the tubes with the respective grids. These circuits are also connected to the respective terminals of the source of potential.

1,386,321. August 2, 1921; filed May 9, 1919. TELEPHONE REPEATER EQUIPMENT; three claims; C. S. Demarest, Brooklyn, N. Y.; assigned to American Telephone & Telegraph Co. The feature of this testing system is the provision of means, responding when testing apparatus is connected to the repeater apparatus, for disconnecting the normally-connected networks from the repeater apparatus and for connecting networks for balancing the testing apparatus.

1,386,464. August 2, 1921; filed November 1, 1919. CIRCUIT CONTROLLING TELEPHONE RECEIVER SUPPORT; seven claims; J. B. Furber, Rahway, N. J. An extensible support of the lazy tongs type is mounted on a bracket attached to a desk stand standard and carries at its outer end the receiver. There is also a member which is connected with the receiver switch hook to operate it in connection with the operation of the extensible support.